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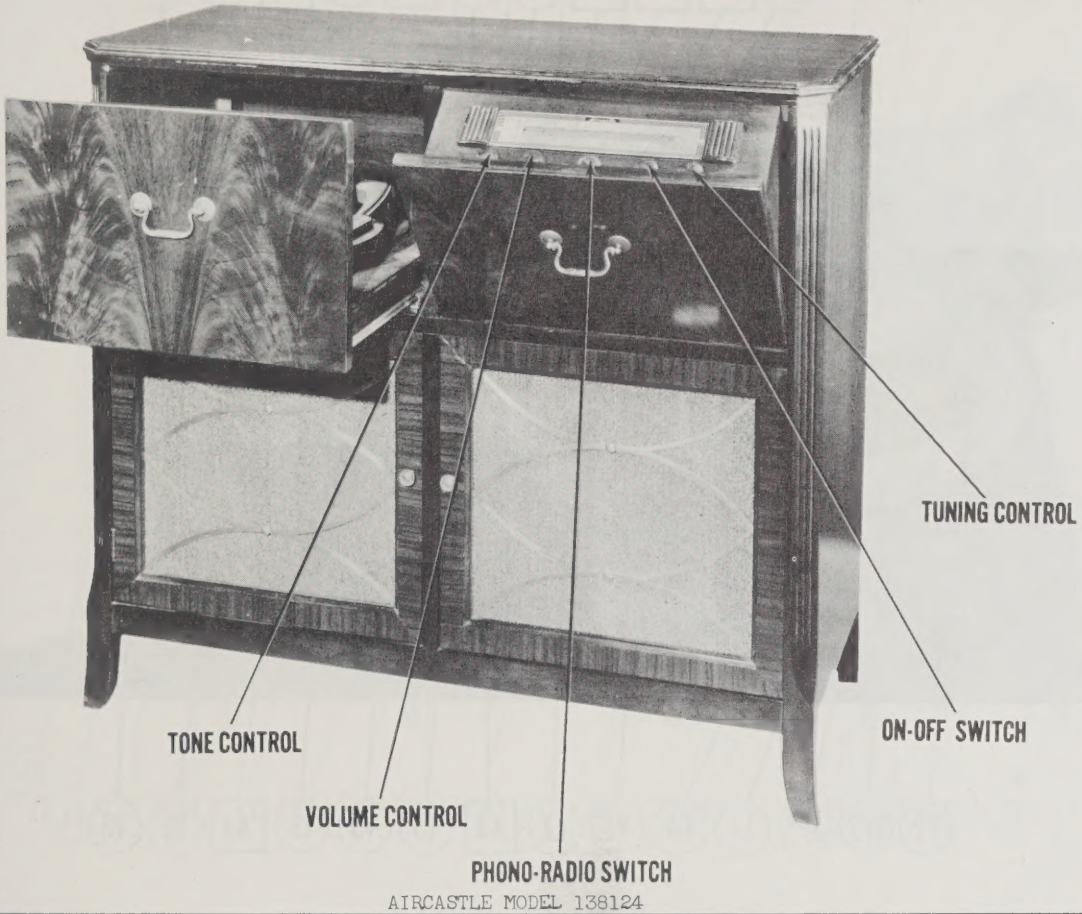

AIRCASTLE
MODEL 138124

AIRCASTLE
MODEL 138124

AIRCASTLE MODEL 138124

TRADE NAME Aircastle, Model 138124
SUPPLIER Spiegel, Inc., 1061 W. 35th St., Chicago, Illinois.
TYPE SET AC Operated Combination Phono-Radio, Superheterodyne Receiver with Loop Antenna.
TUBES (SIX) Types 6SK7 RF Amp., 6SA7 Converter, 6SK7GT IF Amp., 6SQ7 DET.-AVC-AF, 6K6GT Power Output, 5Y3GT Rectifier

POWER SUPPLY 110-120 Volts AC RATING .49 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST 530-1725 KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set dial pointer, turn tuning capacitor fully closed and set the pointer to the extreme left hand calibration mark at the low frequency end of the dial backplate. The remaining calibration marks are (left to right): 600KC, 1000KC, 1400KC and 1700KC

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1MFD	High side to pin 8 (Grid) of 6SA7 (V2). Low side to chassis.	455KC (400~ Mod.)	Tuning Cap fully open.	Across Voice coil	A1, A2, A3, A4	Adjust for maximum output.
2	250 MMF	High side to external antenna lug. (Link connected across center and left hand terminals). Low side to chassis.	1725KC (400~ Mod.)	"	"	A5	" " " "
3	250MMF	"	1500KC	Tune for maximum signal.	"	A6, A7	" " " "

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PARTS LIST AND DESCRIPTIONS

AIRCASTLE
MODEL 138124

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	RF Amp.	6SK7	6SK7	8N	
V2	Converter	6SA7	6SA7	8R	
V3	IF Amp.	6SK7GT	6SK7GT	8N	
V4	DET.-AVC-AF	6SQ7	6SQ7	8Q	
V5	Power output	6K6GT	6K6GT	7S	
V6	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIRCASTLE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1	16	450	A18-274	PRS450/16	BR1645		M-16-450	UT-16	Filter
C2	16	450	A18-279	PRS450/16	BR1645		M-16-450	UT-16	Filter
C3	.05	200	A16-152	P288-05	GT2S5		ST-4-05	TM-15	AVC Filter
C4	200	500	B15-189	1468-0002	5W5T2	GP2K-200	MO.5-32	1FM-32	Fixed Trimmer
C5	.05	200	A16-152	P288-05	GT2S5		ST-4-05	TM-15	RF Cath Bypass
C6	5		A83-355	1468-000005	5W5V5	NPOK-5	MO.5-55	MS-55	RF Coupling
C7	50	500	A15-175	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Fixed Trimmer
C8	.05	400	A16-158	P488-05	GT4S5		ST-4-05	TM-15	RF Screen Bypass
C9	.05	200	A16-152	P288-05	GT2S5		ST-4-05	TM-15	AVC Filter
C10	.05	400	A16-158	P488-05	GT4S5		ST-4-05	TM-15	OSC Anode Bypass
C11	50	500	A15-175	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	OSC Grid Cap
C12	.05	200	A16-152	P288-05	GT2S5		ST-4-05	TM-15	IF Cath Bypass
C13	.05	400	A16-158	P488-05	GT4S5		ST-4-05	TM-15	IF Screen Bypass
C14	.01	400	A16-156	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Audio Coupling
C15	250	500	A15-176	1468-00025	5W5T25	GP2K-250	MO.5-325	1FM-325	AF Plate Bypass
C16	.05	400	A16-158	P488-05	GT4S5		ST-4-05	TM-15	AF Plate Decoupling
C17	.01	600	A16-156	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Audio Coupling
C18	.01	400	A16-156	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Tone Comp.
C19	.01	1000	A16-168	P1088-01	GT16S1		STM-10-01	MB-11	Output Plate Bypass

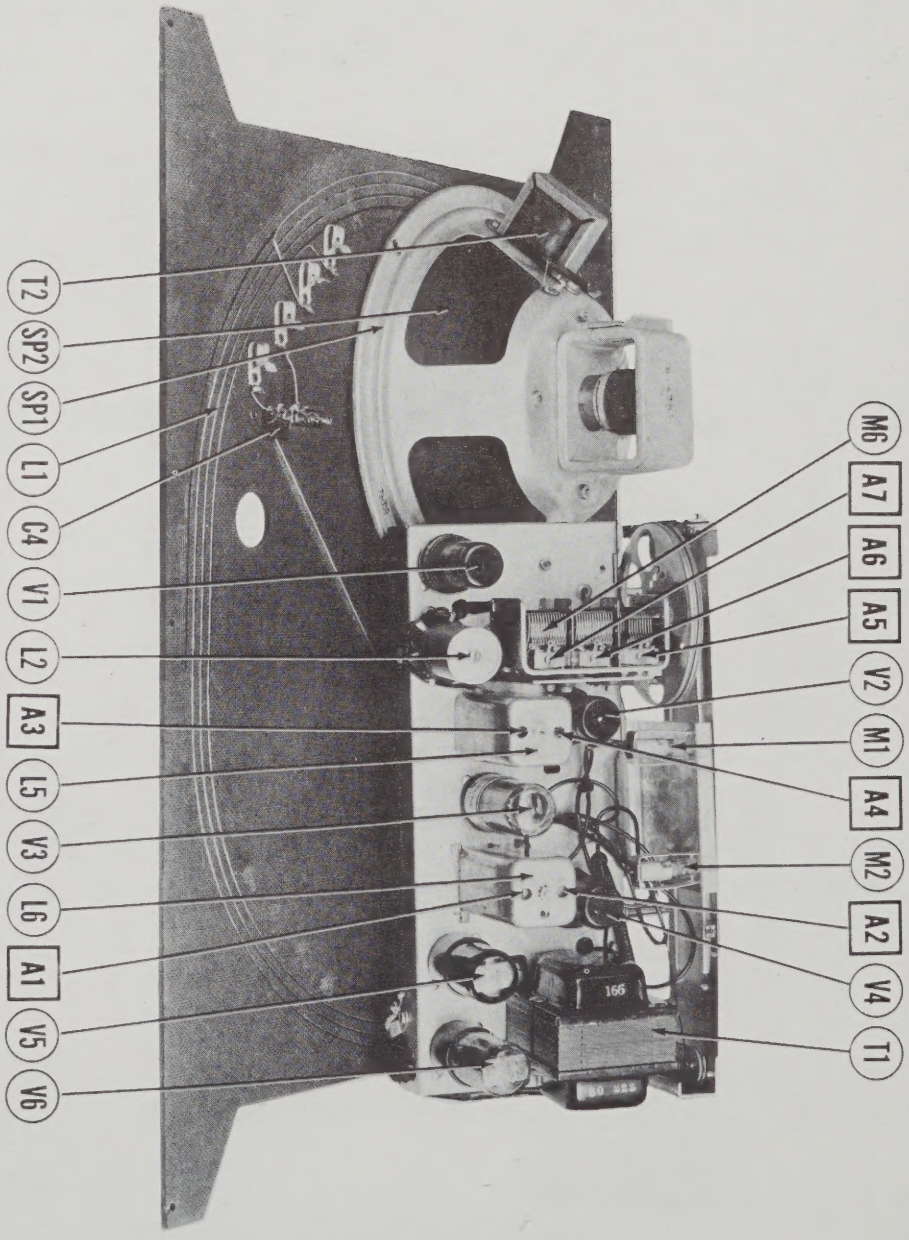
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRCASTLE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ	½	A24-169	D13-133	D13-133	Volume control
B	Shaft		Not req.	E	KSS-3	Attach to R1A per instr.
R2A	2 Meg	½	A26-123	D13-139	AM-83-S	Tone control
B	Shaft		Not req.	E	KSS-3	Attach to R2A per instr.

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRCASTLE PART No.	IRC PART No.	IDENTIFICATION CODES
R3	220KΩ	½	A60-667	BTS-220K	AVC Network
R4	150Ω	½	A60-686	BW-½-150	RF Cathode
R5	100KΩ	½	A60-671	BTS-100K	RF Screen
R6	27KΩ	1	A60-692	BTA-27K	OSC Anode
R7	22KΩ	½	A60-659	BTS-22K	OSC Grid
R8	150Ω	½	A60-686	BW-½-150	IF Cathode
R9	100KΩ	½	A60-671	BTS-100K	IF Screen
R10	10MEG.	½	A60-663	BTS-10MEG	AF Grid
R11	220KΩ	½	A60-667	BTS-220K	AF Plate
R12	220KΩ	½	A60-667	BTS-220K	AF Plate Decoupling
R13	220KΩ	½	A60-667	BTS-220K	Series Phono
R14	470KΩ	½	A60-662	BTS-470K	Output Grid
R15	560Ω	1	A60-701	BTA-560	Output Cathode
R16	82KΩ	1	A60-700	BTA-82K	Voltage Divider
R17	1000Ω	2	A60-699	BT-2-1000	Filter

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	AIRCASTLE PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1	117V AC @ .49A	580V CT .058A DC	5V AC @ 2A	6.4 V AC @ 1.9A	C80-223	P-6119‡	PV-60	P-3160 #

Drill new mounting holes and add series resistor to reduce plate voltage.
‡ Mount vertically with universal mounting brackets.

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		AIRCASTLE PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	7000Ω	3.4Ω	350Ω	.6Ω	A80-222	A-3823	RO-13	A-2901	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			AIRCASTLE PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	V.C. IMP.				
SP1	PM	3.4Ω	B79-359	ST-120 MOD.P10-S	10A31	*Replace output transformer to match 6-8Ω voice coil.
	CONE DIA.	V.C. DIA.				
SP2	9 7/8"	1"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	AIRCASTLE PART No.	MEISSNER PART No.	
L1	Loop Ant.	.2Ω		S84-248		
L2	Ant Coil	60Ω	6Ω	C10-459		Primary winding #2 has resistance of .5Ω
L3	RF Coil	65Ω	2.5Ω	B10-452	14-1057	
L4	OSC Coil	6Ω		B10-446	14-1060	
L5	Input IF	18Ω	18Ω	B10-412	16-5712	
L6	Output IF	21Ω		B10-444		

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					AIRCASTLE PART No.		
M1	Bayonet	6-8V	0.15A	Brown			Type #47
M2	Bayonet	6-8V	0.15A	Brown			Type #47

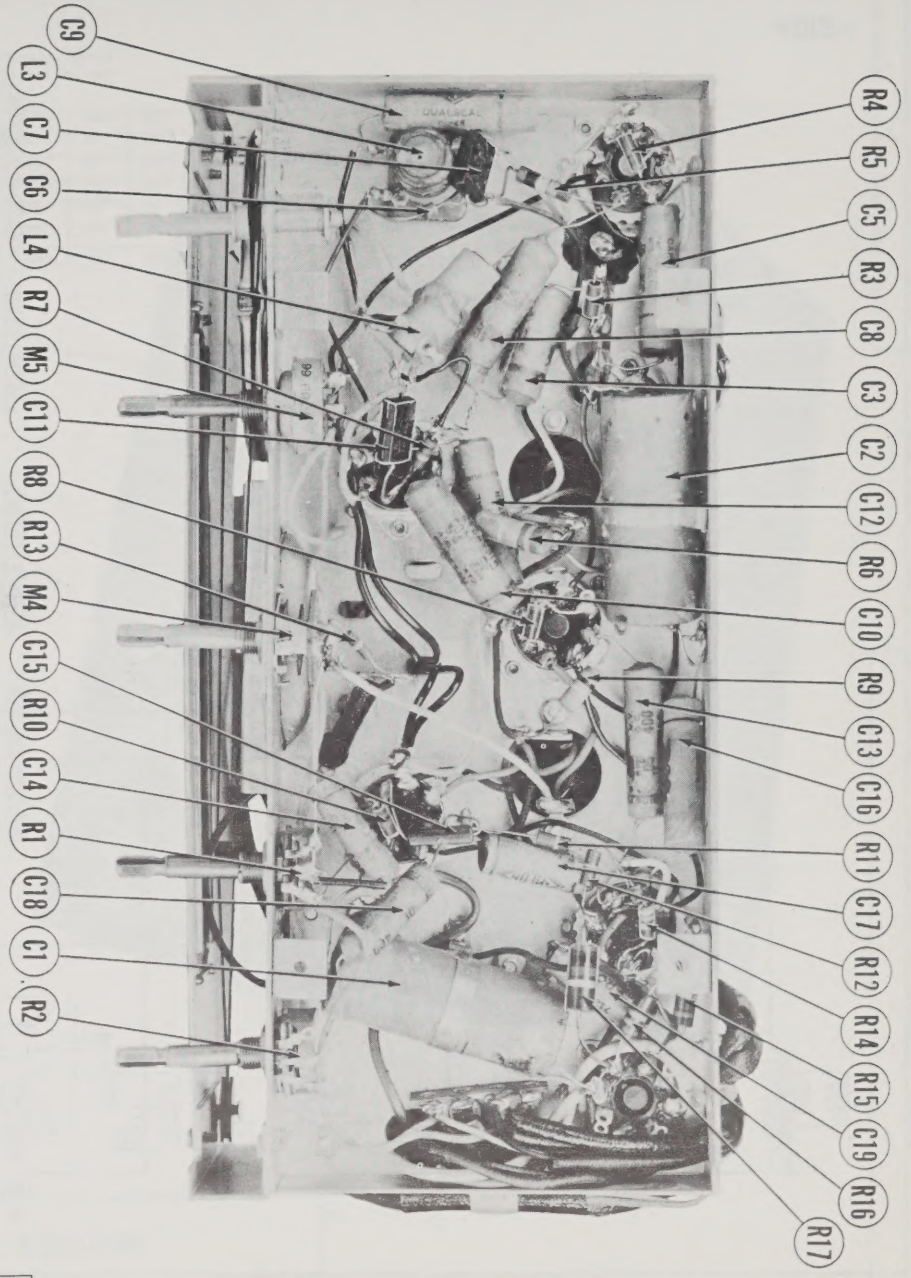
PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA		REMARKS
	AIRCASTLE PART No.	ASTATIC PART No.	
M3		LT-2MA	

MISCELLANEOUS

ITEM No.	PART NAME	AIRCASTLE PART No.	NOTES
M4	Switch	A69-180	Radio-Phono
M5	Switch	A69-169	On-Off
M6	3 Gang Var. Cap.	B19-186	(26-459MMF, 26-459MMF, 29-193MMF)
	Dial Scale	C67-533	
	Dial Pointer	A58-68	
	Knob	A52-263	Tuning
	Knob	A52-264	Tone
	Knob	A52-265	Volume
	Knob	A52-266	On-Off
	Knob	A52-267	Radio-Phono

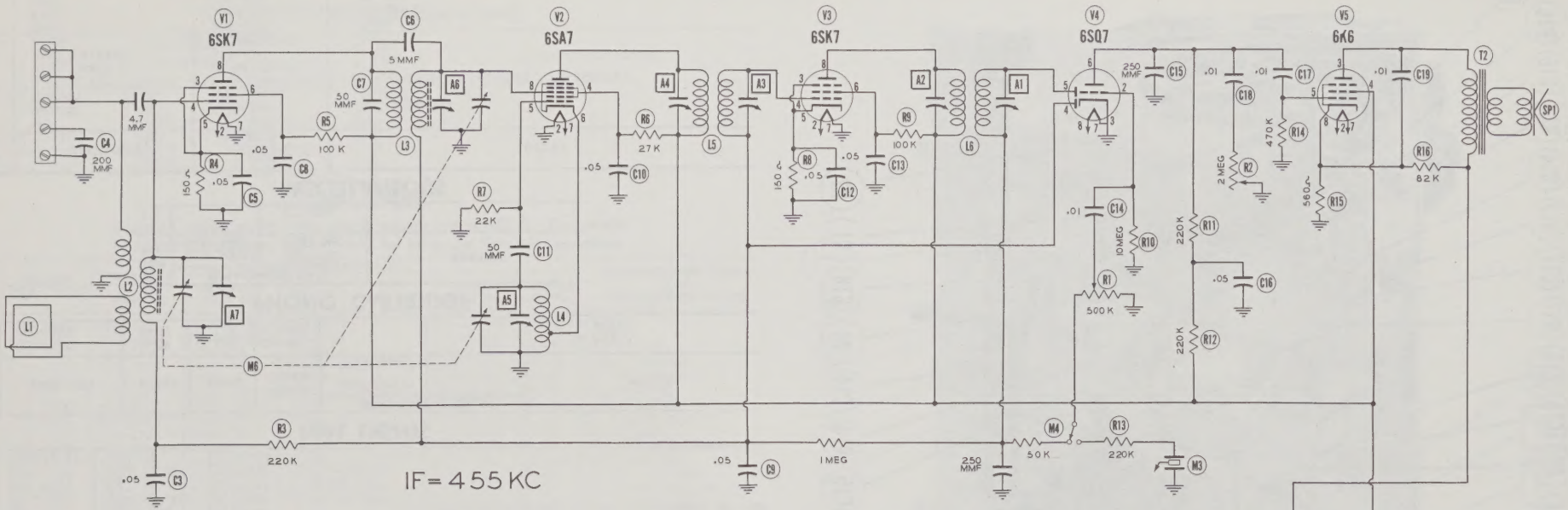
CHASSIS—BOTTOM VIEW

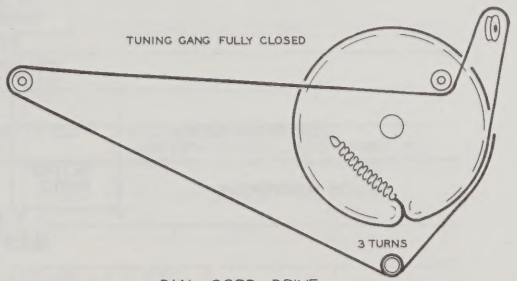


AIRCASTLE MODEL 138124

DATE 6/49 4912-1 SET #64 FOLDER 1

AIRCASTLE MODEL 138124





DIAL CORD DRIVE

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SK7	0V	0V	1.4VDC	-.2VDC	1.4VDC	80VDC	6.5VAC	260VDC
V 2	6SA7	0V	0V	260VDC	75VDC	4-9VDC	0V	6.5VAC	-.6VDC
V 3	6SK7GT	0V	0V	1.2VDC	-.3VDC	1.2VDC	80VDC	6.5VAC	260VDC
V 4	6SQ7	0V	-.3VDC	0V	-.4VDC	-1.4VDC	85VDC	6.5VAC	0V
V 5	6K6GT	0V	0V	280VDC	260VDC	0V	170VDC	6.5VAC	20VDC
V 6	5Y3GT	295VDC	295VDC	0V	280VAC	0V	280VAC	0V	295VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SK7	0Ω	0Ω	150Ω	1.8Meg.	150Ω	*100KΩ	.2Ω	*1000Ω
V 2	6SA7	0Ω	0Ω	*1000Ω	*30KΩ	22KΩ	.8Ω	.2Ω	1.5Meg.
V 3	6SK7GT	0Ω	0Ω	150Ω	1.5Meg.	150Ω	*100KΩ	.2Ω	*1000Ω
V 4	6SQ7	0Ω	10Meg.	0Ω	1.5Meg.	550KΩ	*500KΩ	.2Ω	0Ω
V 5	6K6GT	0Ω	0Ω	*350Ω	*1000Ω	500KΩ	300KΩ	.2Ω	560Ω
V 6	5Y3GT	65KΩ	65KΩ	INF.	230Ω	INF.	215Ω	INF.	65KΩ

* Measured from pin 8 of V6

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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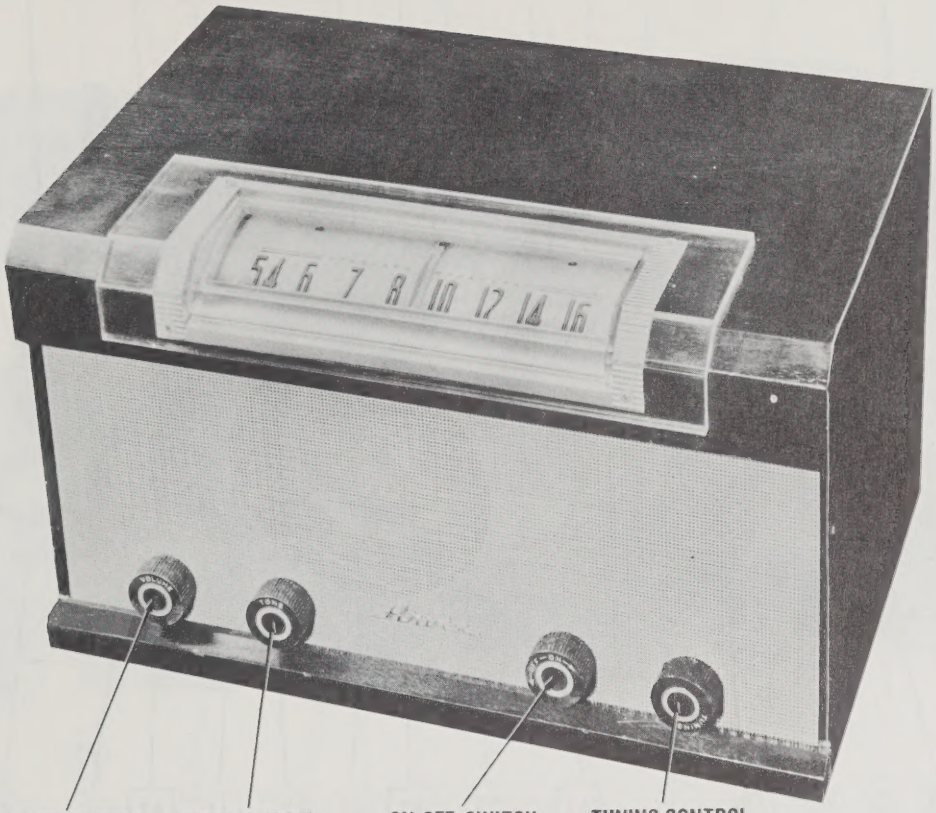
4912-1

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

ARVIN
MODELS 264T, 265T



ARVIN MODEL 264T

TRADE NAME Arvin, Models 264T, 265T (Ch. RE-265)
MANUFACTURER Noblitt-Sparks Industries, Inc., Columbus, Indiana
TYPE SET AC-DC Operated Superheterodyne Receiver with Loop Antenna.
TUBES (SIX) Types 12SK7GT RF Amp., 12SA7GT Converter, 12SK7GT IF Amp., 12SQ7 DET-AVC-AF, 35L6GT Power Output, 35Z5GT Rectifier.

POWER SUPPLY 110-120 Volts AC-DC RATING .26 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST 540-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not connect a .1 MFD. cap. in series with low side of signal generator and B-.

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low frequency end of dial.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to center stator of tuning gang. Low side to B-.	455KC	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used reduce dummy antenna to .001 MFD to reduce hum modulation.
2.		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		Loop	1400KC	Tune for max. signal.	"	A6, A7	Rock tuning gang and adjust for maximum output.
4.		Loop	600KC	600KC	"		If necessary, bend tuning gang plates for maximum output. If plates are changed, repeat steps 2 & 3.

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PARTS LIST AND DESCRIPTIONS

ARVIN
MODEL 264T

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		ARVIN PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	12SK7GT	12SK7GT	8N	
V2	Converter	12SA7GT	12SA7GT	8AD	
V3	IF Amp.	12SK7GT	12SK7GT	8N	
V4	DET-AVC-AF Amp.	12SQ7	12SQ7	8Q	
V5	Audio Output	35L6GT	35L6GT	7AC	
V6	Rectifier	35Z5GT	35Z5GT	5AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	ARVIN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	
C1A	50	150	A21578	PRSA150/50-30	EDL-5315		M-5030-150	TA-530	Filter Red Note 1
C1B	30	150							Filter Blue Note 1
C2	20	150	A22110	PRS150/20	BR2015		M-20-150	UT-201	Filter Blue Note 1
C3	.001	600	C20067-102	P688-001	GT6D1	GP2L-001	ST-6-001	TM-21	Ant. Isolation
C4	.05	400	C20067-503	P488-05	GT4S5		ST-4-05	TM-15	AVC Filter
C5	.0005	600	C20069-501	1468-0005	GT6T5	GP2K-500	ST-6-0005	TC-35	RF Coupling
C6	50		C20204-500	1468-00005	5W5S5	GP1K-50	MC.5-45	IFM-45	OSC Grid Cap.
C7	220		C20226-221	1468-0002	5W5T2	GP2K-200	MO.5-32	IFM-32	Diode Filter
C8	.01	400	C20068-103	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Audio Coupling
C9	100	500	C20065-101	1468-0001	5W5T1	GP1K-100	MO.5-31	IFM-31	AF Grid Bypass
C10	.002	600	C20068-202	P688-002	GT6D2	GP2M-002	ST-6-002	TM-22	Tone Comp.
C11	.005	400	C20068-502	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Audio Coupling
C12	.005	400	C20068-502	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Output Plate Bypass
C13	.1	200	C20067-104	P288-1	GT2P1		ST-2-1	72P2	Line Isolation
C14	.05	400	C20068-503	P488-05	GT4S5		ST-4-05	TM-15	Line Filter
C15	10	500		1469-00001	5R5J1	NPOK-10	MO5.5-41	MS-41	Fixed Trimmer Note 2

Note 1 - On later productions C1 and C2 may be replaced by Arvin Part #C22111.
Note 2 - Not used in all models.

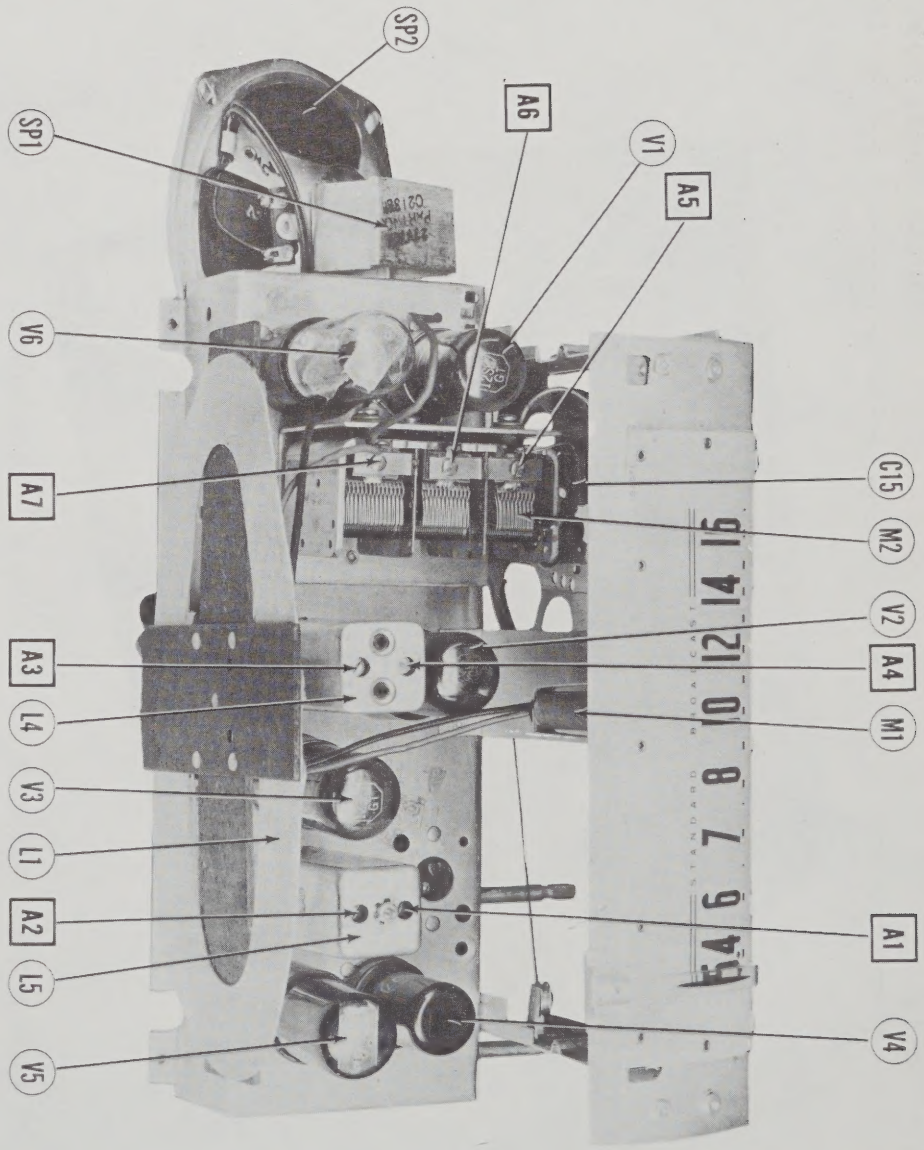
CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	ARVIN PART No.	IRC PART No.	CLAROSTAT PART No.	
R1	1 Meg	½	C21404-1		15/16-63-Z	Volume control.
R2 A	500KΩ	½		D13-133	AM-60-Z	Tone control.
B	Shaft		C21405-1	E	KSS-3	Attach to R2A per instr.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	ARVIN PART No.	IRC PART No.	
R3	330KΩ	½	C20060-334	BTS-330K	Line Isolation.
R4	8200Ω	½	C20120-822	BTS-8200	RF Plate.
R5	6800Ω	½	C20060-682	BTS-6800	Conv. Grid.
R6	22KΩ	½	C20060-223	BTS-22K	Osc Grid.
R7	6.8 Meg	½	C20060-685	BTS-6.8 Meg	AVC Network.
R8	1 Meg	½	C20060-105	BTS-1 Meg	" "
R9	1 Meg	½	C20060-105	BTS-1 Meg	Vol. Cont Shunt.
R10	3.3 Meg	½	C20060-335	BTS-3.3 Meg	AF Grid.
R11	330KΩ	½	C20060-334	BTS-330K	AF Plate.
R12	150Ω	½	C20060-151	BW-½-150	Output Cathode.
R13	1200Ω	2	C20223-122	BW-½-1200	Filter.
R14	15Ω	½	C20060-150		Rectifier Buffer.
R15	150Ω	½	C20060-151		Pilot Light Shunt.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		ARVIN PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	2150Ω	3Ω	108Ω TAP @ 5.2Ω	.3Ω	AC21577-1	A-3330	RO-3	A-3031	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	V. C. IMP.	ARVIN PART No.	JENSEN PART No.	QUAM PART No.	
SP1	PM	3.4Ω	C 21331	ST-1074 Mod. P5-W	52A1	#Use adaptor baffle.
	CONE DIA.	VC DIA.				
SP2	5-1/8"	9/16"				

R F COILS

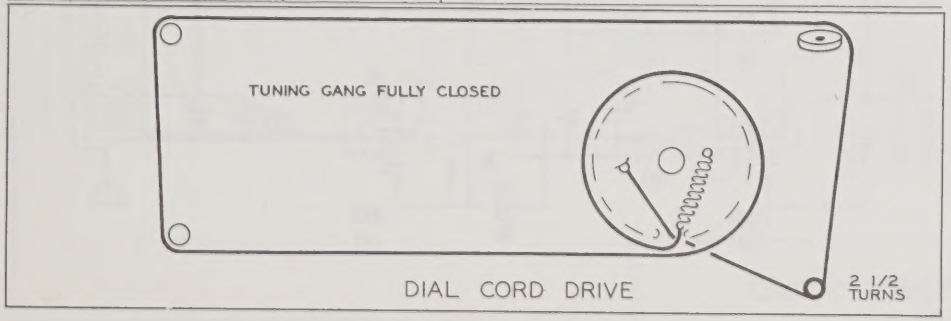
ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	ARVIN PART No.	MEISSNER PART No.
L1	Loop Ant.	0Ω	.6Ω	AD21574-1	
L2	RF Coil	6.8Ω		AC21575-1	
L3	OSC Coil	.9Ω	5.8Ω	AC21576-1	14-1060
L4	Input IF	13.5Ω	13.5Ω	AC21572-1	16-6666
L5	Output IF	10Ω		AC21573-1	

DIAL LIGHTS

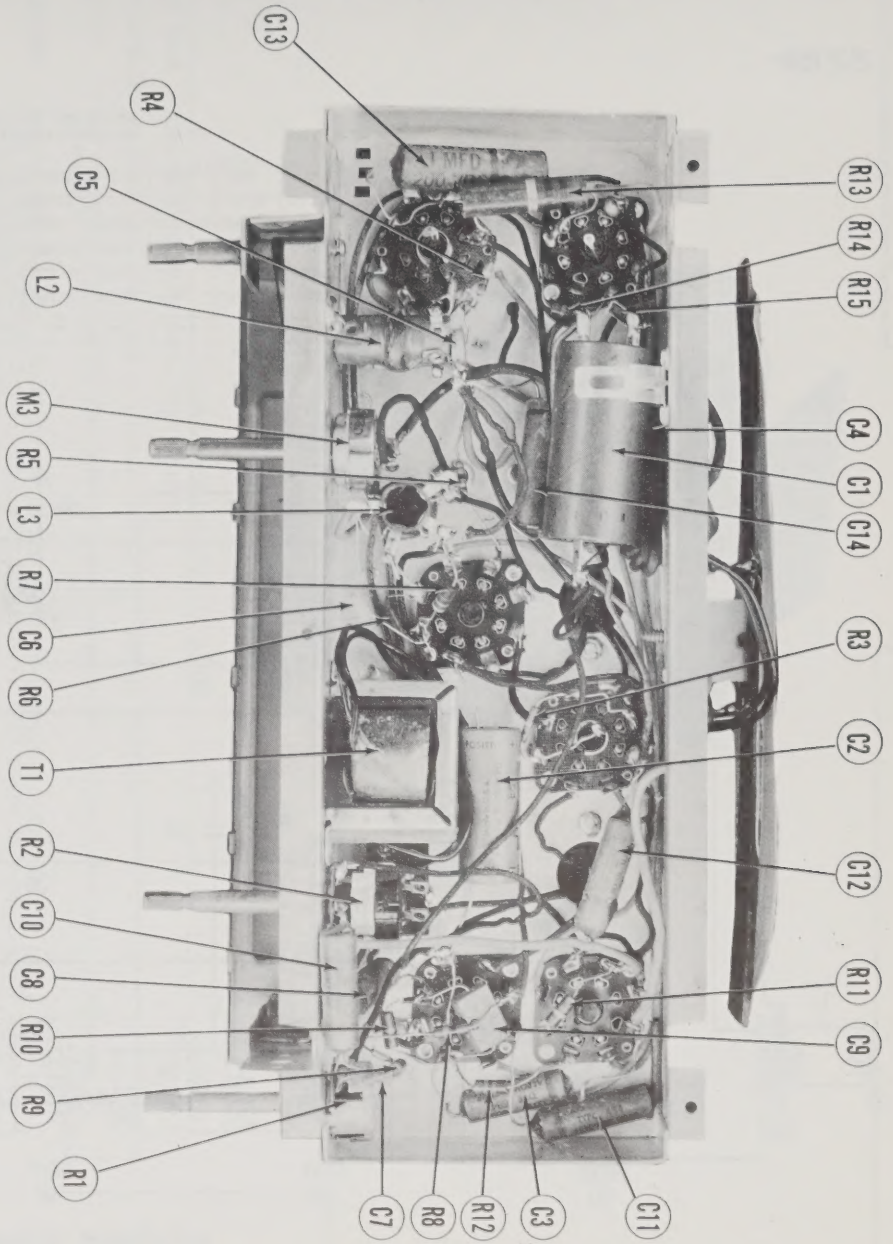
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					ARVIN PART No.		
M1	Bayonet	6-8V	.15	Brown	A19351		Type #47

MISCELLANEOUS

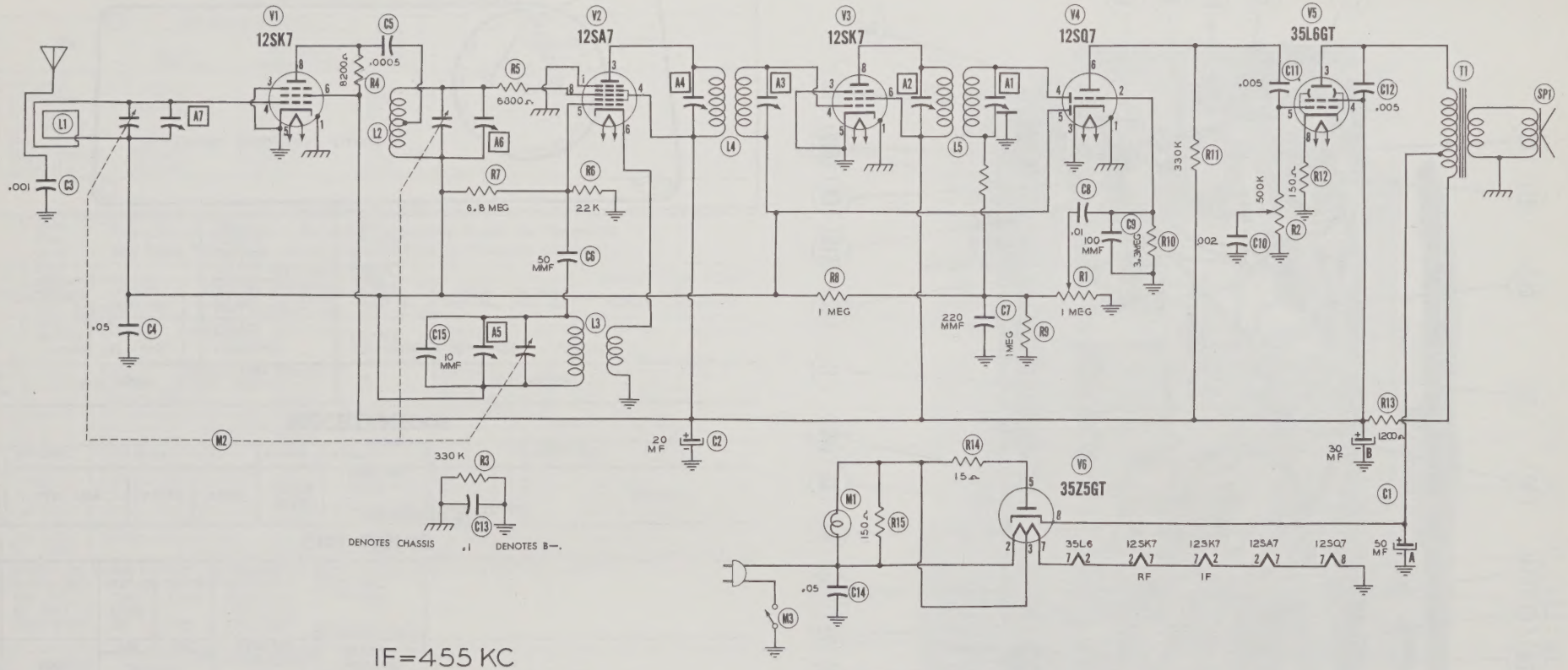
ITEM No.	PART NAME	ARVIN PART No.	NOTES
M2	3 Gang. Var. Cap.	AD22154-1	(28-452MMF, 23-399MMF, 8-192MMF)
M3	Switch	C22157	On-Off
	Dial Scale	D22152	
	Dial Pointer	AC21377-1	
	Cabinet	R21379-3	264T
	Cabinet	R21379-4	265T
	Knob	C21427	Volume
	Knob	C21428	Tuning
	Knob	C22150	On-Off
	Knob	C22151	Tone



CHASSIS—BOTTOM VIEW



ARVIN MODEL 264T



IF=455 KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SK7GT	0V	50VAC	0V	-.7VDC	0V	85VDC	38VAC	28VDC
V 2	12SA7GT	0V	25VAC	85VDC	90VDC	§-11VDC	0V	12VAC	-.5VDC
V 3	12SK7GT	0V	25VAC	0V	-.7VDC	0V	85VDC	38VAC	85VDC
V 4	12SQ7	0V	-.7VDC	0V	-.3VDC	-.7VDC	45VDC	12VAC	0V
V 5	35L6GT	0V	50VAC	117VDC	85VDC	0V	0V	85VAC	5VDC
V 6	35Z5GT	0V	117VAC	114VAC	0V	113VAC	120VDC	85VAC	122VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SK7GT	330KΩ	48Ω	0Ω	1.5 Meg.	0Ω	†1.2KΩ	36Ω	†9.5KΩ
V 2	12SA7GT	330KΩ	25Ω	†1.2KΩ	†1.2KΩ	22KΩ	0Ω	12Ω	1.5Meg.
V 3	12SK7GT	330KΩ	25Ω	0Ω	1.5Meg.	0Ω	†1.2KΩ	36Ω	†1.2KΩ
V 4	12SQ7	330KΩ	3.3 Meg.	0Ω	550KΩ	1.5Meg.	†330KΩ	12Ω	0Ω
V 5	35L6GT	Inf.	48Ω	†100Ω	†1.2KΩ	500KΩ	Inf.	82Ω	150Ω
V 6	35Z5GT	Inf.	122Ω	120Ω	Inf.	12Ω	†1.2KΩ	82Ω	50KΩ

† Measured from pin 8 of V6

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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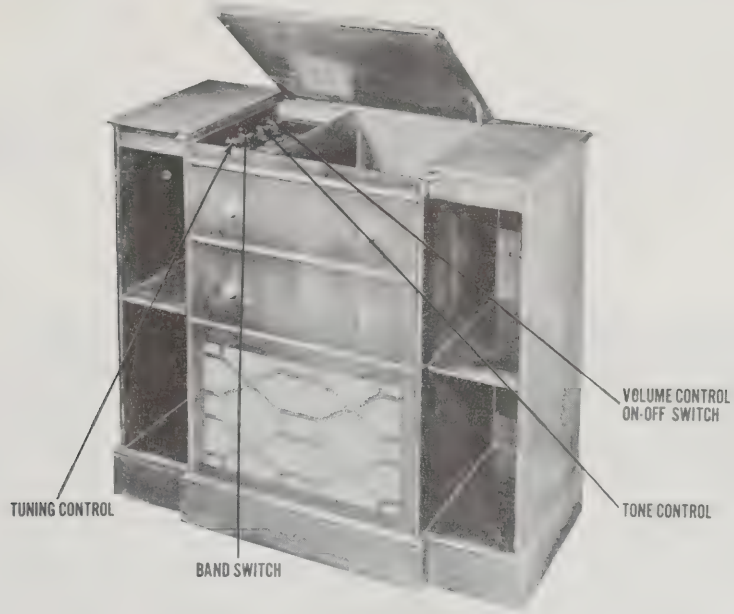
4912-2

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

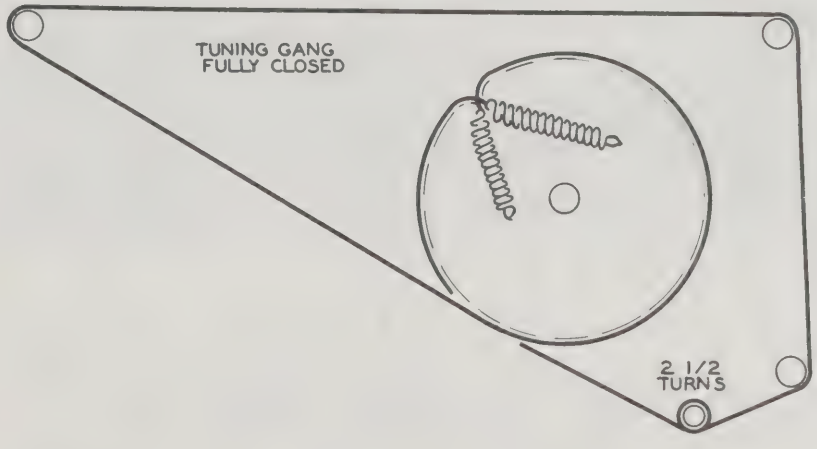


CAPEHART MODEL 33P9

TRADE NAME	Capehart, Models 32P9, 33P9, 34P10
MANUFACTURER	Farnsworth Television and Radio Corp., Fort Wayne, Indiana
TYPE SET	AC Operated Combination Phono-Radio, AM-FM Superheterodyne Receiver with Loop Antenna
TUBES(TEN)	Types 6AG5 RF Amp., 12AT7 FM Converter, 6BE6 AM Converter, 6SK7 1st IF Amp., 6SK7 2nd IF Amp., 6SK7 FM 3rd IF Amp., 6T8 DET-AVC-AF, 6SC7 Phono Pre-Amp., 6V6GT Power Output, 5Y3GT Rectifier
POWER SUPPLY	105-125 Volts AC — RATING .69 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1620KC — FREQ. MOD. 87.5-108.5MC

DISASSEMBLY INSTRUCTIONS

1. Remove four control knobs.
2. Remove FM antenna plug and AM leads from rear of chassis.
3. Remove pick-up lead and phono motor plug from underneath changer.
4. Remove speaker plug from rear of chassis.
5. Remove four 11/32" hex nuts holding speaker. Remove speaker.
6. Remove three phillips screws holding pre-amp. Remove pre-amp.
7. Remove three snap plugs from inside left record shelf.
8. Remove three screws holding chassis. Remove chassis. Two people should remove chassis to prevent dropping it.



DIAL CORD DRIVE

CAPEHART
MODELS 32P9, 33P9, 34P10

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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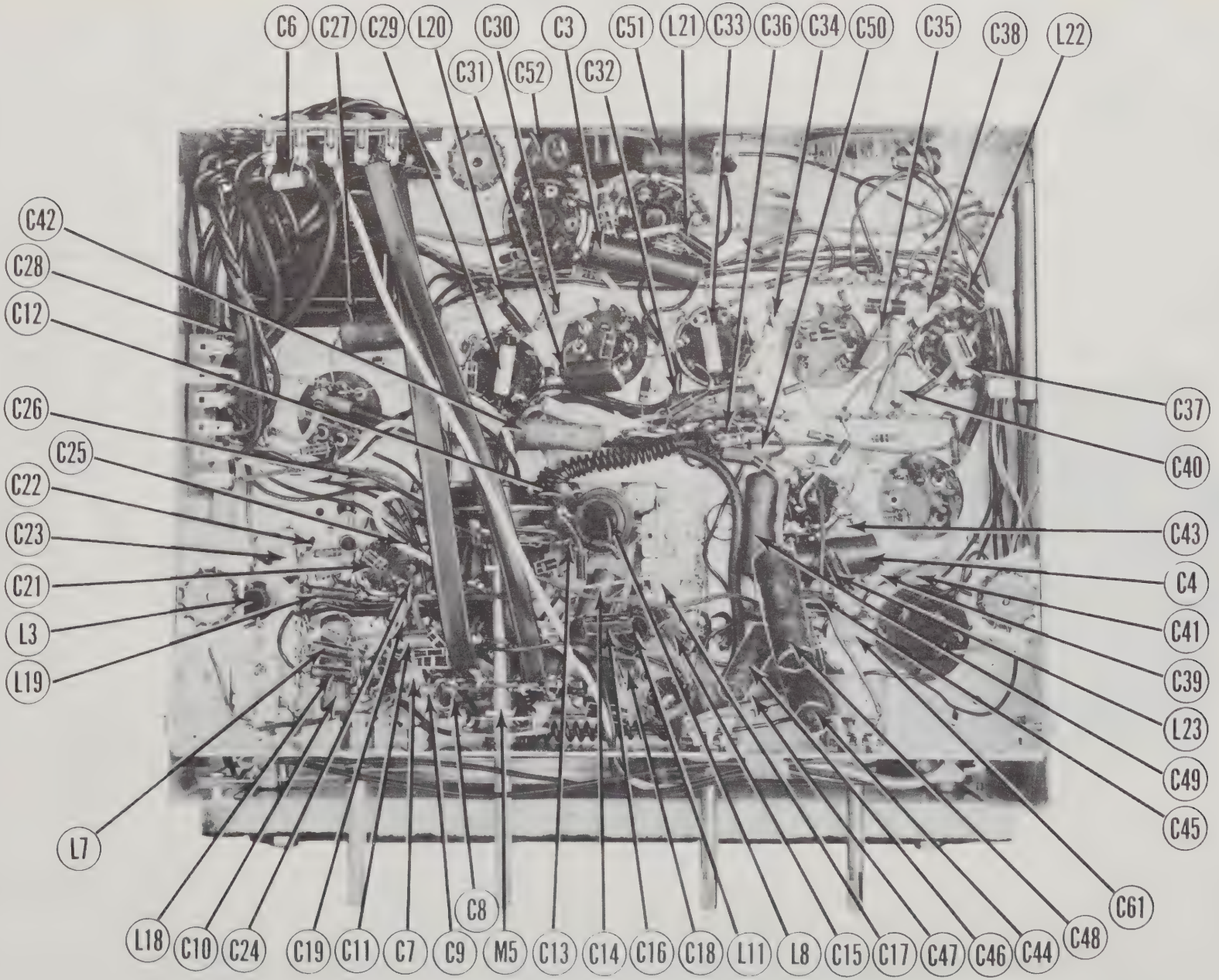

C6
C27
C29
L20
C30
C3
C51
L21
C33
C36
C34
C50
C35
C38
L22
C31
C52
C32
C42
C28
C12
C26
C25
C22
C23
C21
L3
L19
L7
C37
C40
C43
C4
C41
C39
L23
C49
C45
C61
C48
C8
L18
C10
C24
C19
C11
C7
C9
M5
C13
C14
C16
C18
L11
L8
C15
C17
C47
C46
C44

R32
R65
R33
B
R35
R36
R34
R47
A
R44
R45
R42
R27
R31
R28
R43
R46
R26
R29
R30
R25
R61
R62
R24
R63
R23
R22
R64
R21
R20
R3
R1
R41
R38
R2
R15
R13
R16
R8
R14
R4
R5
R6
R7
R37
R19
R17
R12
R18
R9
R10
R11

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	NOTES
		CAPEHART PART No.	STANDARD REPLACEMENT		
1	RF Amp.	6AU6	6AU6	7BD	
2	FM Converter	12AT7	12AT7		
3	AM Converter	6BE6	6BE6	7CH	
4	1st IF Amp.	6SK7	6SK7	8N	
5	2nd IF Amp.	6SK7	6SK7	8N	
6	FM 3rd IF Amp.	6SK7	6SK7	8N	
7	DET. AVC-AF	6T8	6T8		
8	Phono Pre Amp.	6SC7	6SC7	8S	
9	Power Output	6V6GT	6V6GT	7AC	
10	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	CAPEHART PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	
C1A	30	450	25424	AF4444J*	UP2222		DY-3020	EL-420*	▲Filter
B	20	450			45*		20-450		■Filter
C	20	450							▲Filter
C2A	20	450	25463	AF44J	UP2245		DY-2x20	EL-220	▲Decoupling Note 1
B	20	450					-450		■Decoupling
C3	25	25	25158	PRS25/25	BR252A		M-25-25	TA-25	Output Cath. Bypass
C4	4	150	25270	PRS150/4	BR415		M-4-150	UT-41	Stabilizing Cap
C5	47	500	25193	1469-00005	5R5Q5	NP0M-50	MOS.5-45	MS-45	Fixed Trimmer
C6	20	300	25492	1468-0000 25	5W5Q2	GP1K-25	MO.5-425	MS-42	Ext. Ant. Coupling
C7	240	300	25427	1468-00025	5W5T25	GP2K-250	MO.5-325	1FM-325	RF Coupling
C8	1500	300	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	AVC Filter
C9	1500	300	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	RF Cath. Bypass
C10	.05	200	25196	484-05	GT2S5		ST-4-05	TM-15	RF Cath. Bypass
C11	1500	300	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	RF Screen Bypass
C12	1500	300	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	RF Plate Decoupling
C13	1	300	25497	1468-0000 01					RF Coupling
C14	.05	200	25196	484-05	GT2S5		ST-4-05	TM-15	AVC Filter
C15	47	500	25193	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Osc. Grid Cap
C16	480	500	25504	1469-0005	5R5T5		MOS.5-35	MS-35	Fixed Padder ±3%
C17	20	300	25492	1469-0000 25	5R5Q2	NP0K-20	MOS.5 -425	MS-42	Fixed Trimmer
C18	.01	600	25186	684-01	GT6S1	GP2-335-01	ST-6-01	TM-11	RF Bypass
C19	30	300	25493	1468-0000 25	5W5Q3	GP1K-25	MO.5-43	MS-43	RF Coupling
C20	30	300	25329	1468-0000 25	5W5Q3	GP1K-25	MO.5-43	MS-43	Osc. Grid Cap
C21	1	300	25497	1468-0000 01					Osc. Coupling
C22	1500	350	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	RF Bypass
C23	1500	350	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	Decoupling Note 2
C24	1500	350	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	Mixer Cath. Bypass
C25	40	300	25507	1468-00004	5W5Q4		MO.5-44	1FM-44	Fixed Trimmer
C26	1500	300	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	Mixer Plate Decoupling
C27	.05	600	25196	684-05	GT6S5		ST-6-05	TM-15	Conv. Plate Decoupling
C28	.1	200	25182	484-1	GT2P1		ST-2-25	TM-1	AVC Filter
C29	1500	300	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	1st IF Screen Bypass
C30	1500	300	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	1st IF Plate Decoup.
C31	1500	500	25299	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	Fixed Trimmer
C32	.05	200	25196	484-05	GT2S5		ST-4-05	TM-15	2nd IF Cath. Bypass
C33	1500	300	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	2nd IF Screen Bypass
C34	1500	300	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	2nd IF Plate Decoup.
C35	100	500	25188	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Filter
C36	100	500	25188	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Filter
C37	1500	300	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	3rd IF Cath. Bypass
C38	1500	300	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	3rd IF Screen Bypass
C39	1500	300	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	3rd IF Plate Decoup.
C40	1500	300	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	3rd IF Decoupling
C41	100	500	25188	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Load Cap
C42	.003	600	25184	684-003	GT6D3	GP2M-003	ST-6-003	TM-23	De-emphasis
C43	1500	300	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	RF Bypass
C44	.01	600	25186	684-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Audio Coupling

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES	
	RESISTANCE	WATTS	CAPEHART PART No.	IRC PART No.		
R38	2.2MΩ	½	77178	MTC-220K	Tone Compensation	
R39	680KΩ	½	77508	BTS-680K	Phono Tone Compensation	See Note
R40	100KΩ	½	77167	BTS-100K	Phono Tone Compensation	See Note
R41	470KΩ	½	77173	BTS-470K	Phono Tone Compensation	See Note 1
R42	3.3Ω	1	77492	BW-1-3.3	Fil. String	See Note 1
R43	10 Meg	½	77182	BTS-10 Meg	AF Grid	
R44	15KΩ	½	77246	BTS-15K	FM Det. Diode Load	
R45	220KΩ	½	77178	BTS-220K		
R46	470KΩ	½	77173	BTS-470K	AVC Network	
R47	220KΩ	½	77178	BTS-220K	AF Plate Load	
R48	3300Ω	½	77240	BTS-3300	Phono Tone Compensation	See Note 1
R49	15KΩ	½	77246	BTS-15K	Phono Tone Compensation	See Note 1
R50	10KΩ	½	77180	BTS-10K	Phono Tone Compensation	See Note 1
R51	3.3 Meg	½	77223	BTS-3.3 Meg	Pre Amp. Grid	See Note 1
R52	3.3 Meg	½	77223	BTS-3.3 Meg	Pre Amp. Grid	See Note 1
R53	100KΩ	½	77167	BTS-100K	Pre Amp. Plate	See Note 1
R54	100KΩ	½	77167	BTS-100K	Pre Amp. Plate	See Note 1
R55	15KΩ	½	77246	BTS-15K	Decoupling	See Note 1
R56	15KΩ	½	77246	BTS-15K	Decoupling	See Note 1
R57	220KΩ	½	See Note 3	BTS-220K	Equalizer Network	See Note 1
R58	220KΩ	½	See Note 3	BTS-220K	Equalizer Network	See Note 1
R59	33KΩ	½	See Note 3	BTS-33K	Equalizer Network	See Note 1
R60	68KΩ	½	See Note 3	BTS-68K	Equalizer Network	See Note 1
R61	220KΩ	½	77178	BTS-220K	Output Grid	
R62	220KΩ	½	77178	BTS-220K	Output Grid	
R63	270Ω	1	77174	BW-1-270	Output Cathode	
R64	15Ω	½	77491	BW-½-15	Bias	See Note 2
R65A	400Ω	10	77463	AB-400	Filter	
B	1000Ω			AB-1000	Filter	

NOTE Used In Model 34P10 Only.
NOTE 1 Used In Models 32P9 and 33P9 Only.
NOTE 2 Some Models Use 22Ω Resistor In This Application.
NOTE 3 Items C58, C59, R57, R58, R59 and R60 are combined into one unit and are obtainable under Mfgr's. Part #13969.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	CAPEHART PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1	117VAC @ .69A	600VCT @ .086A DC	5VAC @ 2A	6.5VAC @ 3.4A	94262	P-6012†	PH-90†	P-2952

†Add series resistor to reduce plate voltage.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		CAPEHART PART No.	STANCOR PART No.	CHICAGO PAR. No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	4100Ω	3.3Ω	410Ω	.5Ω	94235	A-3823‡	RO-9	A-2901‡	‡Drill One New Mtg. Hole

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	V.C. IMP.	CAPEHART PART No.	JENSEN PART No.	QUAM PART No.	
SP1	PM	3.5Ω	13892	ST-103 MOD.P12-R	12A4	
	CONE DIA.	V.C. DIA.				
SP2	11-7/8	1"				

PARTS LIST AND DESCRIPTIONS (Continued)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA CAPEHART PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C45	.47	[illegible]	25193	1468-00005	5W535	GP1K-50	MO.5-45	1FM-45	Tone Comp.
C46	.002	600	25185	684-002	GT6D2	GP2M-002	ST-6-002	TM-22	Tone Comp.
C47	.003	600	25184	684-003	GT6D3	GP2M-003	ST-6-003	TM-23	Tone Comp.
C48	.01	600	25186	684-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Audio Coupling
C49	.02	[illegible]	25195	684-02	GT6S2		ST-6-02	TM-12	Audio Coupling
C50	[illegible]	[illegible]	25196	1467-0001	SW T1	GP1K-10[illegible]	MO.5-31	1FM-31	AF Plate Bypass
C51	.00[illegible]	[illegible]	25194	684-003	GT6K3		ST-6-003	TM-23	Output Plate Bypass
C52	.00[illegible]	[illegible]	25[illegible]1	684-00[illegible]	GT6D5	GP2M-00[illegible]	ST-6-005	TM-25	Line Filter
C53	.0[illegible]	[illegible]	25[illegible]	684-0[illegible]	GT6S2		ST-6-02	TM-12	Phono Tone Comp. Note 1
C54	.01	[illegible]	25[illegible]	684-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Phono Tone Comp. Note 1
C55	.00[illegible]	[illegible]	25[illegible]	684-00[illegible]	GT6L5	GP2M-005	ST-6-005	TM-25	Phono Tone Comp. Note 1
C56	.0[illegible]	[illegible]	25[illegible]	684-05	GT6S[illegible]		ST-4-05	TM-15	Audio Coupling Note 1
C57	.01	600	25186	684-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Audio Coupling Note 1
C58	.01	100	Note 3	484-01	GT2S1	GP2-335-01	ST-4-01	TM-11	Equalizer Net Note 1
C59	.01	100	Note 3	484-01	GT2S1	GP2-335-01	ST-4-01	TM-11	Equalizer Net Note 1
C60	.003	600	25184	684-003	GT6D3	GP2M-003	ST-6-003	TM-23	Audio Coupling Note 1
C61	1500	300	25273	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	Filament Bypass Note 2

*Parallel Sections To Obtain Desired Capacity.
NOTE 1 Used On Models 32P9 and 33P9 Only.
NOTE 2 Not Used In All Models.
NOTE 3 Item No. C58, C59, R57, R58, R59, And R60 Are Combined Into One Unit Obtainable Under Mfgrs. Part No. 13869.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA CAPEHART PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1	3.2 Meg	½	78155			Volume control tapped @ 1.7 Meg
R2A	3.2 Meg	½	78186	L13-140	AM-67-5	Tone control
B	Shaft		Not Req.	E	KSS-3	Attach to R2A per instructions

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA CAPEHART PART No.	IRC PART No.	IDENTIFICATION CODES
R3	[illegible]	½	77178	BTS-200K	Ant. Loading
R4	1 Meg	½	77181	BTS-1 Meg	AVC Network
R5	1 Meg	½	77181	BTS-1 Meg	AVC Network
R6	220Ω	½	77186		RF Cathode
R7	33K	½	77183	BTS-33K	RF Screen
R8	1000Ω	½	77223	BTS-1000	RF Plate Decoupling
R9	10K	½	77180	BTS-10K	FM Osc. Grid
R10	1000Ω	½	77223	BTS-1000	FM Osc. Plate
R11	2200Ω	½	77184	BTS-2200	Mixer Cathode
R12	1000Ω	½	77223	BTS-1000	Mixer Plate Decoupling
R13	47Ω	1	77219		Parasitic Suppressor
R14	100K	½	77167	BTS-100K	AVC Network
R15	22K	½	77169	BTS-22K	Osc. Grid
R16	10K	1	77022	BTA-10K	Osc. Anode
R17	1000Ω	½	77223	BTS-1000	Converter Plate Decoupling
R18	100K	½	77167	BTS-100K	1st IF Trans. Shunt
R19	1 Meg	½	77181	BTS-1 Meg	AVC Network
R20	68Ω	½	77245		1st IF Cathode
R21	33K	½	77183	BTS-33K	1st IF Screen
R22	1000Ω	½	77223	BTS-1000	1st IF Plate Decoupling
R23	100K	½	77167	BTS-100K	2nd IF Grid
R24	68Ω	½	77245		2nd IF Cathode
R25	220Ω	½	77186		2nd IF Cathode
R26	33K	½	77183	BTS-33K	2nd IF Screen
R27	1000Ω	½	77223	BTS-1000	2nd IF Plate Decoupling
R28	47K	½	77172	BTS-47K	Diode RF Filter
R29	470K	½	77175	BTS-470K	Diode Load
R30	1 Meg	½	77181	BTS-1 Meg	AVC Network
R31	100K	½	77167	BTS-100K	FM IF Grid
R32	[illegible]	½	77186		FM IF Cathode
R33	33K	½	77183	BTS-33K	FM IF Screen
R34	1000Ω	½	77223	BTS-1000	FM IF Plate Decoupling
R35	1000Ω	½	77223	BTS-1000	FM IF Decoupling
R36	22K	½	77169	BTS-22K	De-emphasis
R37	100K	½	77167	BTS-100K	De-emphasis

DATE 6/49 4912-3 SET #64 FOLDER #2

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

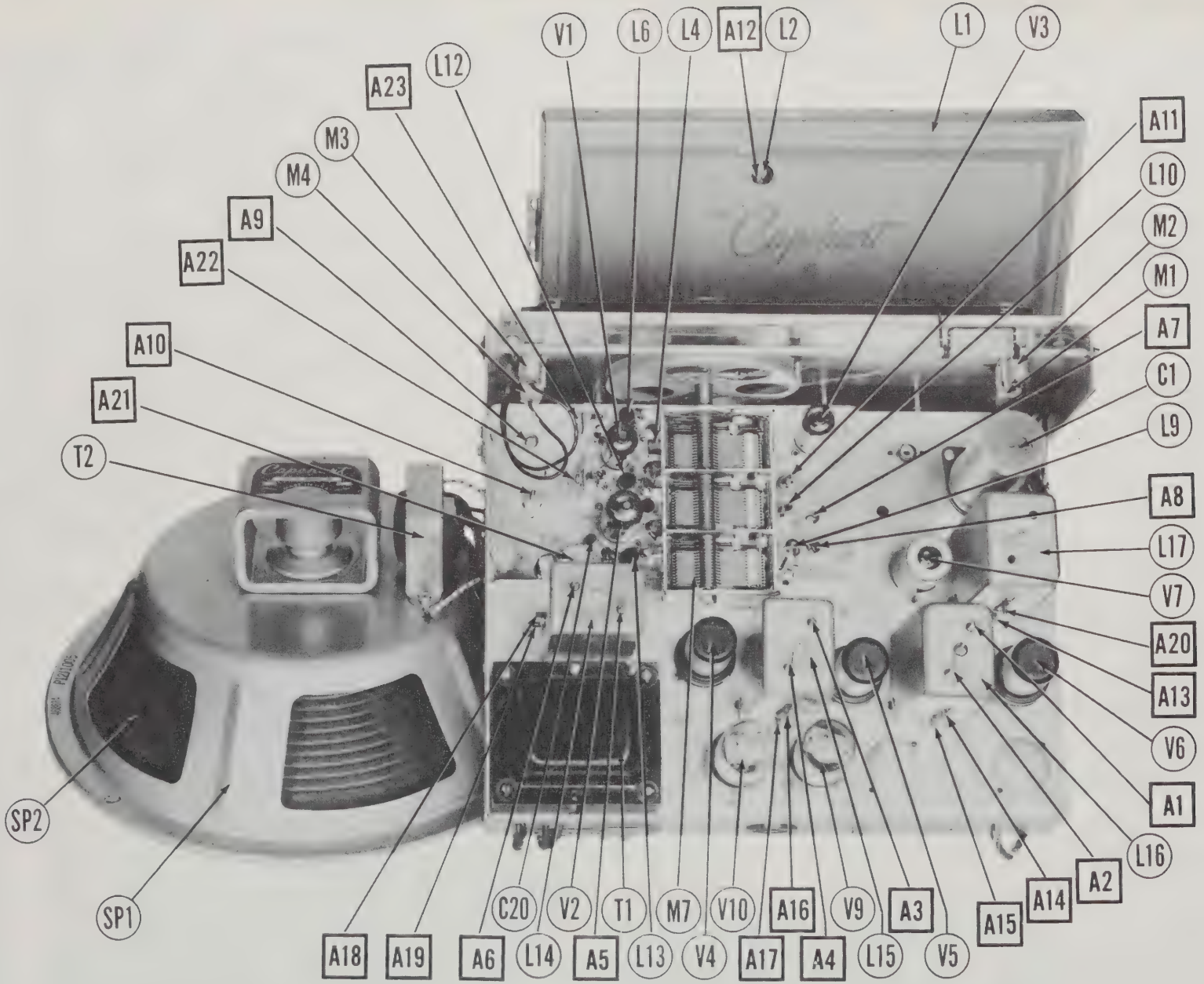
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA CAPEHART PART No.	REPLACEMENT DATA MEISSNER PART No.	
L1	AM Loop Ant	1Ω		38983		
L2	IF Wave Trap	15Ω		38996		
L3	Loop Loading Coil	3Ω		38963		
L4	RF Ant. Choke	.2Ω		38984		
L5	FM Dipole Ant.	0Ω		08151		
L6	FM Ant.Coil	0Ω		38958		
L7	RF Plate Choke	.2Ω		38884		
L8	AM RF Coil	70Ω	3.5Ω	38961		
L9	RF Grid Choke	.2Ω		38884		
L10	RF Choke	.2Ω		38884		
L11	AM Osc.Coil	3Ω		38962		
L12	FM RF Coil	0Ω		38959		
L13	FM Osc.Coil	0Ω		38960		
L14A	AM 1st IF	9Ω		38957		
B	FM 1st IF	.5Ω				
L15A	AM 2nd IF	9.5Ω#		38950		#Includes FM Primary Winding
B	FM 2nd IF					
L16A	AM 3rd IF	10Ω#	9.5Ω	38951		
B	FM 3rd IF		.5Ω			
L17	Ratio Det.	1.5Ω	.2Ω	38952		
L18	Fil. Choke	.2Ω		38884		
L19	Fil. Choke	.2Ω		38884		
L20	Fil. Choke	.2Ω		38884		
L21	Fil. Choke	.2Ω		38884		
L22	Fil. Choke	.2Ω		38884		
L23	Fil. Choke	.2Ω		38884		

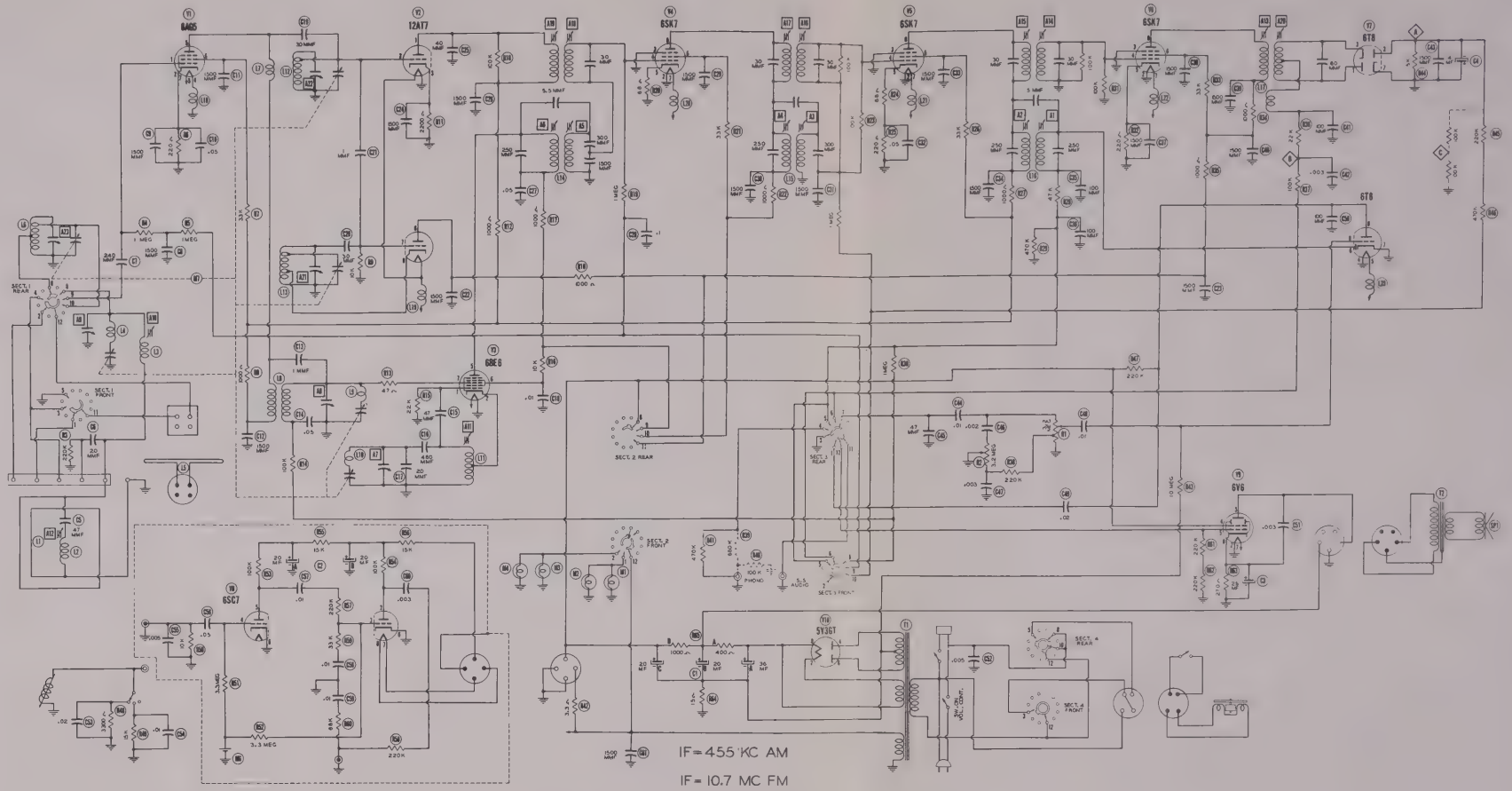
DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA CAPEHART PART No.		NOTES
M1	Bayonet	6-8V	0.25A	Blue	42185		Type #44
M2	Bayonet	6-8V	0.25A	Blue	42185		Type #44
M3	Bayonet	6-8V	0.25A	Blue	42185		Type #44
M4	Bayonet	6-8V	0.25A	Blue	42185		Type #44

MISCELLANEOUS

ITEM No.	PART NAME	CAPEHART PART No.	NOTES
M5	Switch	90269	Band
M6	Bias Cell	95005	(Models 32P9, 33P9 Only)
M7	3 Gang Var. Cap.	17210	(15-514MMF) Each Section
A7, A8	Dual Trimmer	26278	BC Osc. Adj. / BC RF Adj.
A9	Trimmer	26279	BC Ant. Adj.
A21	Trimmer	26231	FM Osc. Adj.
A22, A23	Dual Trimmer	26280	FM RF Adj. / FM Ant. Adj.
	Dial Glass	31437	AM
	Dial Glass	31438	FM
	Dial Pointer	94133	
	Knob	59495	Tuning
	Knob	59508	Band Switch
	Knob	59509	Bass Tone


V1
L6
L4
A12
L2
L1
V3
L12
A23
M3
M4
A9
A22
A10
A21
T2
A11
L10
M2
M1
A7
C1
L9
A8
L17
V7
A20
A13
V6
A1
L16
A2
A14
A15
A3
V9
A16
V10
M7
T1
V2
C20
A6
L14
A5
L13
V4
A17
A4
L15
V5
A18
A19
SP2
SP1



RADIO PHONO SWITCH IN PHONO POSITION

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6AQ5	-.5VDC	-1.2VDC	0	6.3VAC	-.12VDC	-.1VDC	-.1VDC		
V2	12AT7	150VDC	0V	-1.1VDC	6.3VAC	6.2VAC	2.4VDC	2.4VDC	0V	0V
V3	12AU7	3-13VDC	0V	0V	6.3VAC	210VDC	220VDC	-.4VDC		
V4	6BA7	0V	0V	0V	-.4VDC	-.4VDC	240VDC	240VDC	100VDC	
V5	6BA7	0V	0V	0V	-.1VDC	3.1VDC	260VDC	100VDC	260VDC	
V6	6BA7	0V	0V	0V	0V	+.2VDC	260VDC	-.2VDC	-.2VDC	
V7A	6T8	-.3VDC	-.8VDC	-.1VDC	0V	-.2VDC	-.1VDC	0V	-.1VDC	-.1VDC
V7B	6T8	-.2VDC	-.7VDC	-.2VDC	0V	+.2VDC	+.1.4VDC	0V	-.1VDC	-.1VDC
V8	6BE6	0V	0V	-.1VDC	-.1VDC	-.1VDC	0V	0V	1.4VDC	
V9	6V6GT	0V	0V	0V	260VDC	270VDC	0V	0V	5.2VAC	0VDC
V10	5Y3GT	-1.2VDC	300VDC	0V	300VAC	0V	300VAC	0V	300VDC	

TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6AQ5	150K	0	0	150	+.12M	+.12M			
V2	12AT7	150K	0	0	150	+.12M	+.12M	0	0	
V3	12AU7	150K	0	0	150	+.12M	+.12M			
V4	6BA7	150K	0	0	150	+.12M	+.12M			
V5	6BA7	150K	0	0	150	+.12M	+.12M			
V6	6BA7	150K	0	0	150	+.12M	+.12M			
V7A	6T8	1.1MEG	150	0	150	1.1MEG	150K	0	1.1MEG	
V7B	6T8	1.1MEG	150	0	150	1.1MEG	150K	0	1.1MEG	
V8	6BE6	1.1MEG	150	0	150	1.1MEG	150K	0	1.1MEG	
V9	6V6GT	0M	0	0	150	1.1MEG	150K	0	1.1MEG	
V10	5Y3GT	1.1MEG	Ind.	0	1400	Ind.	150K	0	Ind.	

* Measured from pin 8 of V10

* VOLTAGE AND RESISTANCE READINGS TAKEN IN AM POSITION

1. **DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.**
2. **Socket connections are shown as bottom views.**
3. **Measured values are from socket pin to common negative.**
4. **Line voltage maintained at 117 volts for voltage readings.**
5. **Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.**
6. **Volume control at maximum, no signal applied for voltage measurements.**

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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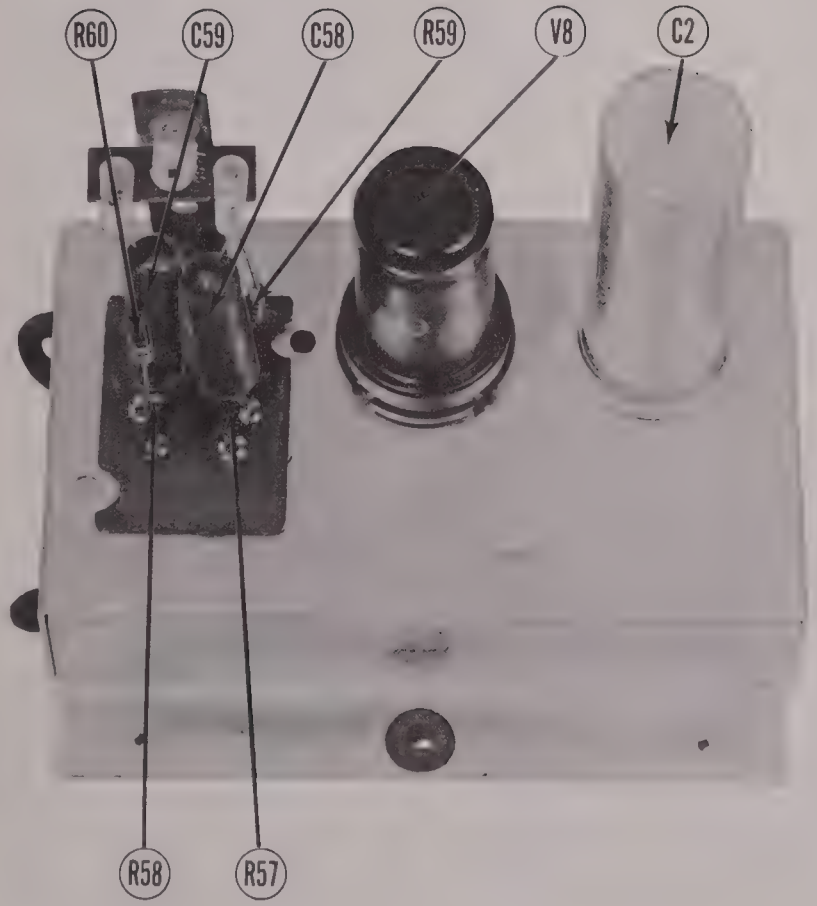
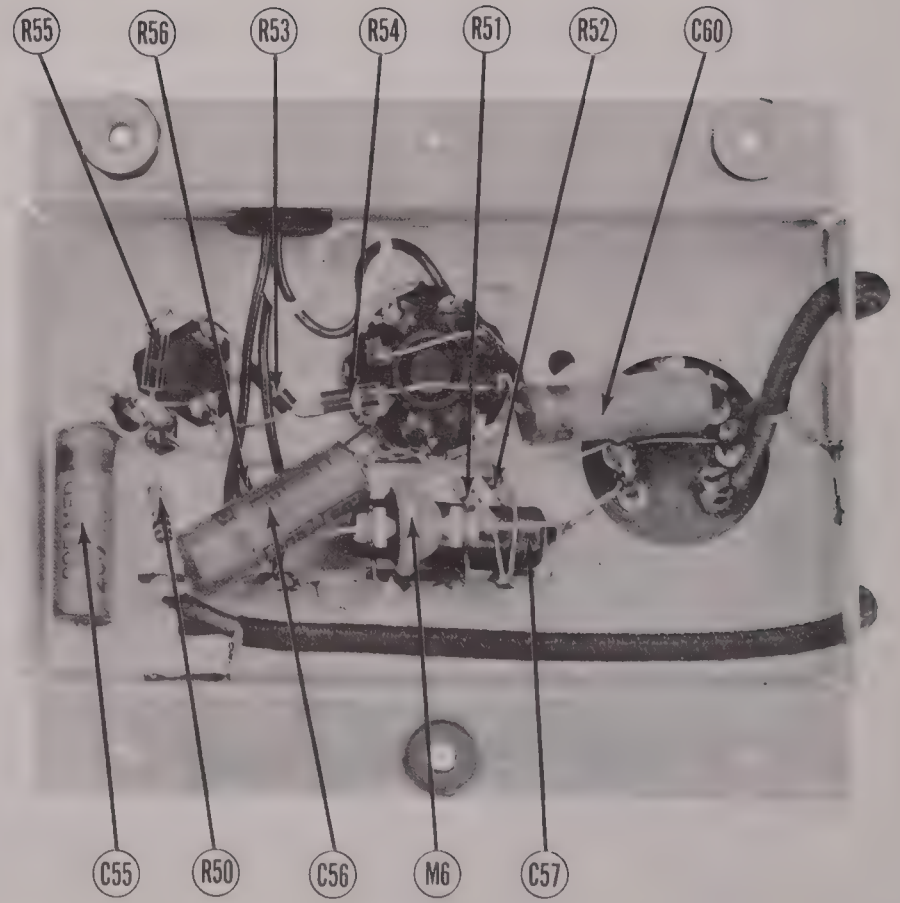

R60
C59
C58
R59
V8
C2
R58
R57


R55
R56
R53
R54
R51
R52
C60
C55
R50
C56
M6
C57

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low frequency end of dial.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (Grid) 6BE6 (V3). Low side to chassis.	455KC	BC (Position 3 left to right)	Tuning cap fully open	Across voice coil	A1,A2 A3,A4 A5,A6	Adjust for maximum output.
2.	.1MFD	High side to terminal 5 on Ant. Terminal strip. Low side to chassis.	1620KC	"	1620KC	"	A7,A8	" " " "
3.	.1MFD	"	1500KC	"	Tune for maximum output.	"	A9	" " " "
4.	.1MFD	"	600KC	"	600KC	"	A10	" " " "
5.	.1MFD	"	"	"	"	"	A11	Rock tuning cap. and adjust for maximum output.
6.	Direct	High side terminal 4 on Ant. terminal strip. Low side to chassis.	455KC	"	Point of non-interference	"	A12	Adjust for minimum output.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Before starting step 11 connect 2 matched 100KΩ (± 5%) carbon resistors in series across stabilizer cap. C4. Connect VTVM DC Probe to junction of these to resistors (Point Ⓑ) and the common lead of VTVM to Point Ⓒ as indicated on schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
7.	1000MMF	High side to pin 4 (Grid) 6SK7 (V6). Low side to chassis.	10.7MC	FM (extreme clockwise)	Tuning cap fully open	DC Probe to Point Ⓐ Common lead to chassis.	A13	Adjust for maximum deflection.
8.	1000MMF	High side to pin 4 (Grid) 6SK7 (V5). Low side to chassis.	"	"	"	"	A14, A15	" " " "
9.	1000MMF	High side to pin 4 (Grid) 6SK7 (V4). Low side to chassis.	"	"	"	"	A16, A17	" " " "
10.	1000MMF	High side to pin 2 (Grid) 12AT7 (V2). Low side to chassis.	"	"	"	"	A18, A19	" " " "
11.	1000MMF	"	"	"	"	DC Probe to Point Ⓑ Common lead to Point Ⓒ	A20	Adjust for zero reading. A positive and negative will be obtained on either side of correct setting. Remove two 100KΩ resistors.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60\ modulation and 450KC sweep. Use 120\ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	BAND SWITCH POS.	CONNECT SCOPE	ADJUST	REMARKS
7.	1000MMF	High side to pin 4 (Grid) 6SK7 (V6). Low side to chassis	10.7MC (450KC Sweep)	10.7MC	FM	Vert. Amp. to Point Ⓐ through 47KΩ carbon resistor. Low side to chassis.	A13	Disconnect stabilizer cap. (C4). Adjust for maximum amplitude & symmetry as per Fig 1
8.	1000MMF	High side to pin 4 (Grid) 6SK7 (V5). Low side to chassis	"	"	"	"	A14, A15	Adjust for maximum amplitude & symmetry as per Fig 1.
9.	1000MMF	High side to pin 4 (Grid) 6SK7 (V4). Low side to chassis	"	"	"	"	A16, A17	"
10.	1000MMF	High side to pin 2 (Grid) 12AT7 (V2). Low side to chassis	"	"	"	"	A18, A19	"
11.	1000MMF	"	"	"	"	Vert. Amp. through 47KΩ resistor to point Ⓑ Low side to chassis.	A20	Reconnect stabilizer cap. Adjust for correct crossover at 10.7MC marker as per Fig 2. Slightly retouch A13 for max. amplitude, if necessary.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
12.	300Ω carbon res.	High side through 300Ω to "High" side of FM Antenna socket. Low side to chassis.	108MC	FM	108MC	DC Probe to Point Ⓐ Low side to chassis.	A21	Adjust for maximum deflection.
13.	300Ω carbon res.	"	"	"	"	"	A22, A23	" " " "

14. Check FM calibration at 88MC. If set does not calibrate correctly, expand or compress oscillator coil windings (depending on whether more or less inductance is necessary) until insertion of either end of a tuning wand causes a decrease in output. Follow same procedure for tracking of RF and Antenna coils. If it has been necessary to correct tracking, it will be necessary to repeat steps 12 and 13. Alternately repeat steps 12, 13 and 14 until adjustments in steps 12 and 13 don't necessitate an adjustment to be made in step 14.

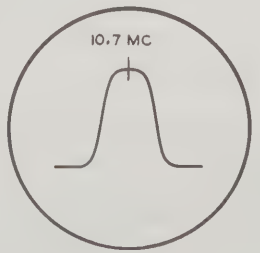


FIG. 1

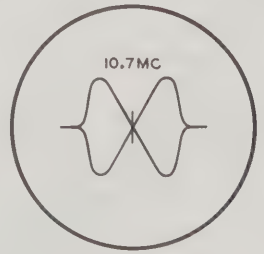
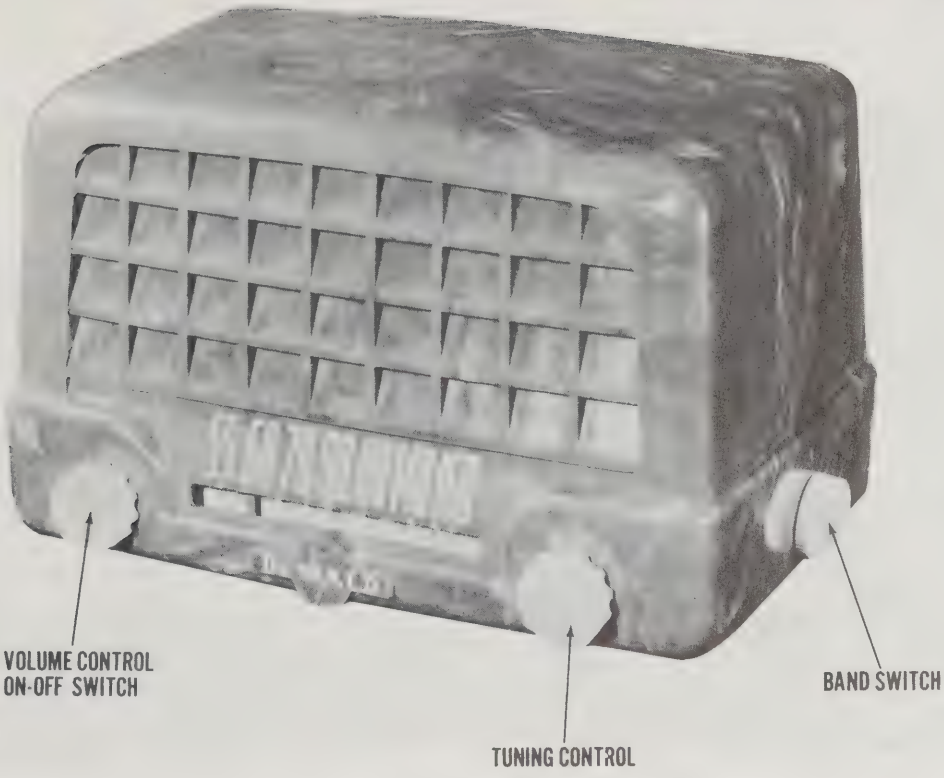


FIG. 2

DEWALD
MODEL C-516



DEWALD MODEL C-516

TRADE NAME Dewald, Model C-516
MANUFACTURER Dewald Radio Mfg. Corp., 35-15 37th Ave., Long Island City, N.Y.
TYPE SET AC-DC Operated 2 Band Superheterodyne Receiver with Loop Antenna.
TUBES (FIVE) Types 12BE6 Converter, 12BA6 IF Amp., 12AT6 DET.-AVC-AF, 50B5 Power Output, 35W4 Rectifier.

POWER SUPPLY 105-125 Volts AC-DC — RATING .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST 535-1650KC — **SHORT WAVE** 4.75-17.2MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low frequency end of dial.

Use isolation transformer if available. If not, connect a .1MFD cap. in series with low side of signal generator and chassis.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to ext. ant. lead, low side thru .1MFD to chassis	455KC	BC	Tuning gang fully open	Across Voice coil	A1,A2 A3, A4	Adjust for maximum output. If AC power is used without an isolation transformer reduce dummy antenna to 200 MMF to reduce hum modulation.
2.	200MMF	"	17.2MC	SW	"	"	A5	Adjust for maximum output.
3.	200MMF	"	16MC	"	Tune for max. signal	"	A6	"
4.	200MMF	"	1650KC	BC	Tuning gang fully open	"	A7	"
5.	200MMF	"	600KC	"	600KC	"	A8	Rock tuning gang and adjust for maximum output. Repeat step 4.

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

DEWALD MODEL C-516

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: DEWALD PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	DET-AVC-AF	12AT6	12AT6	7BT	
V4	Power Output	50B5	50B5	7BZ	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: DEWALD PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	30	150	2033-2	PRSA150/30	EDL3315		DSB-2x30	TA-330	Filter
C1B	30	150		-30			-150	"	
C2	.01	600		P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Ant. Isolation
C3	100			1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Osc. Grid Cap.
C4	4000			1467-004	1D5D4		MWS.5-24	MS-24	Fixed Padder
C5	.05	200		P288-05	GT2S5		ST-4-05	TM-15	AVC Filter
C6	220			1468-0002	5W5T2	GP2K-200	MO.5-32	1FM-32	Diode Filter
C7	.01	400		P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Audio Coupling
C8	220			1468-0002	5W5T2	GP2K-200	MO.5-32	1FM-32	AF Plate Bypass
C9	.01	400		P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Audio Coupling
C10	.02	400		P488-02	GT4S2		ST-4-02	TM-12	Output Plate Bypass
C11	.05	400		P488-05	GT4S5		ST-4-05	TM-15	Line Filter
C12	.05	400		P488-05	GT4S5		ST-4-05	TM-15	RF Bypass

CONTROLS

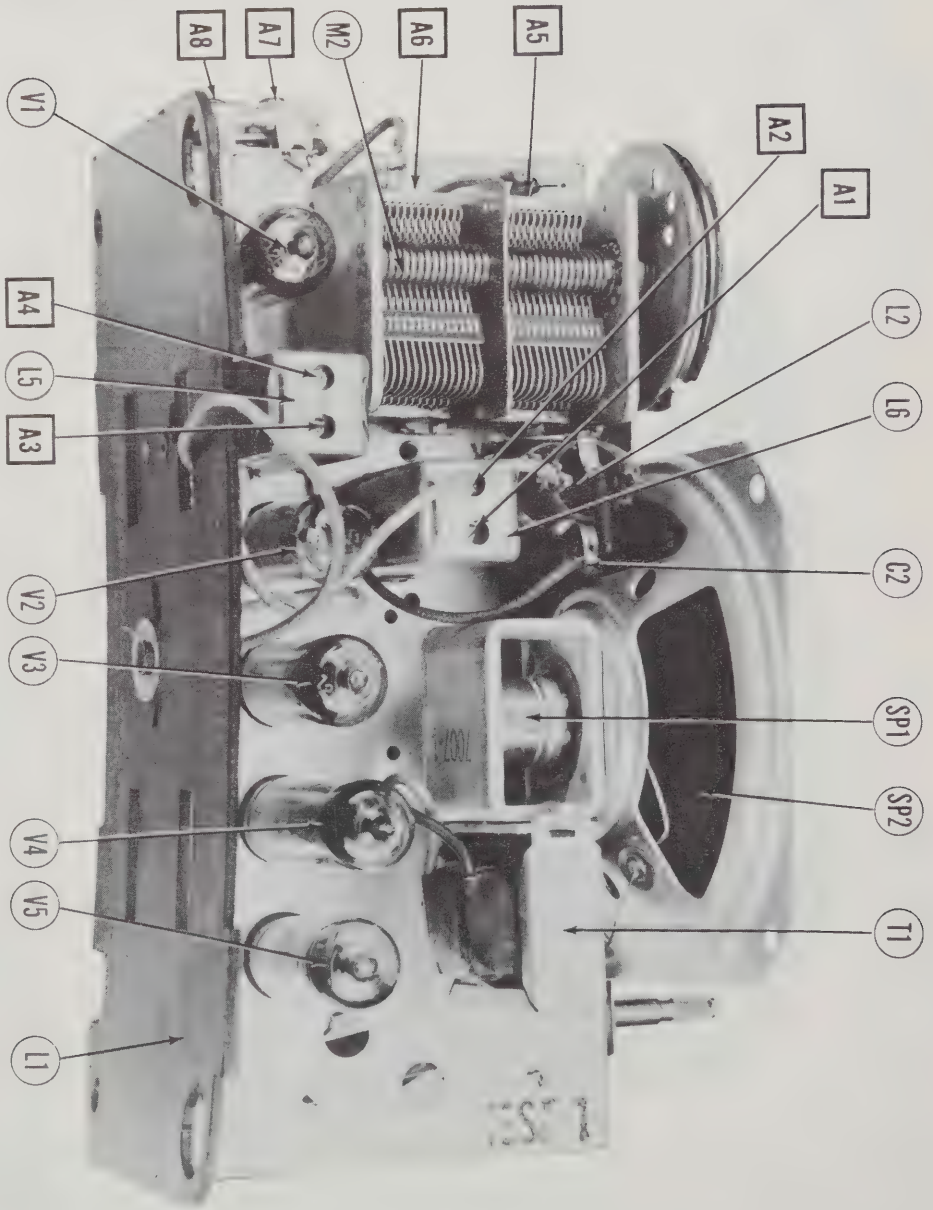
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: DEWA½D PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ	½	3013-2		15/16-63 -Z	Volume Control
B	Switch		Not Req.		SPST.SW.	Attached At Factory

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: DEWALD PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R2	22KΩ	½		BTS-22K	Osc. Grid
R3	150Ω	½		BW-½-150	IF Cathode
R4	2.2 Meg	½		BTS-2.2 Meg	AVC Network
R5	4.7 Meg	½		BTS-4.7 Meg	AF Grid
R6	470KΩ	½		BTS-470K	AF Plate
R7	470KΩ	½		BTS-470K	Output Grid
R8	150Ω	½		BW-½-150	Output Cathode
R9	2700Ω	2	3004	BW-2-2700	Filter
R10	18Ω	½			Rectifier Ballast See Note.

Note Not Used In All Models.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		DEWALD PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	2100Ω	3.1Ω	180Ω	.6Ω		A-3876	RO-2	A-2928	

SPEAKER

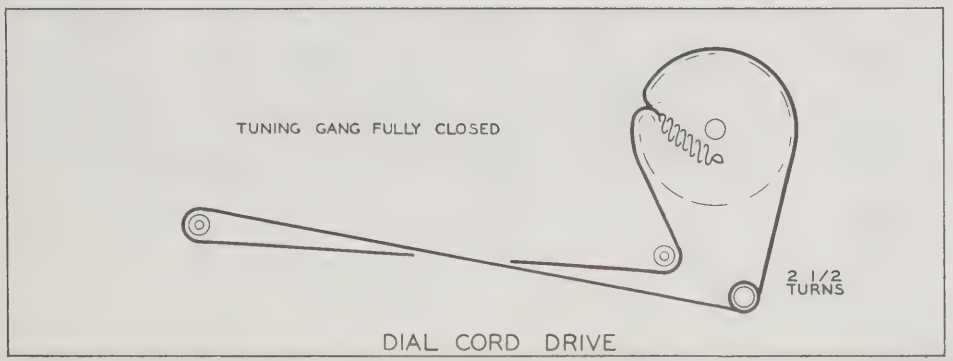
ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			DEWALD PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	V.C. IMP.				
SP1	PM	3.1Ω	7007-1	ST-113 P4-X	4A07	Remount Output Transformer.
	CONE DIA.	V.C. DIA.				
SP2	3-7/8"	9/16"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	DEWALD PART No.	MEISSNER PART No.
L1	Loop Ant.	3Ω		1045	
L2	SW Ant.	.6Ω	.3Ω	1009A	
L3	AM Osc.	5.8Ω		1017	
L4	SW Osc.	.2Ω		1018	
L5	Input IF	15Ω	15Ω	1046-1	16-6678
L6	Output IF	15Ω	15Ω	1046-1	16-6678

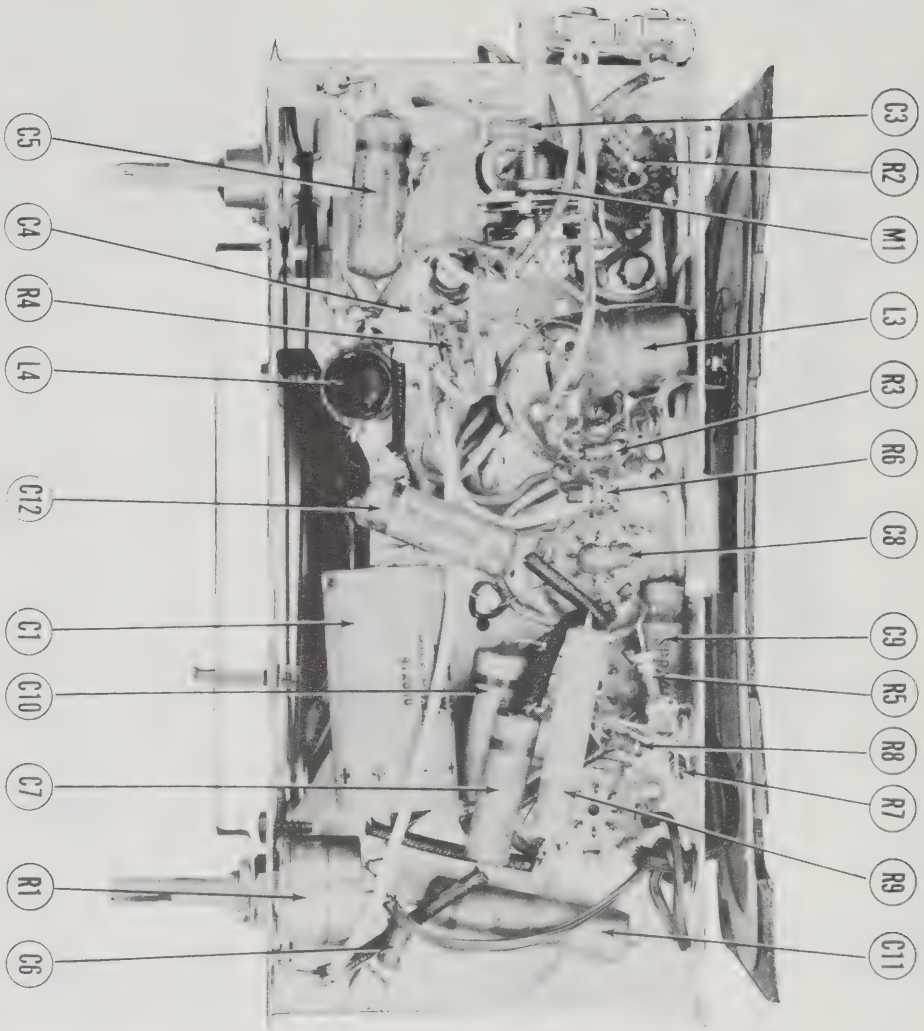
MISCELLANEOUS

ITEM No.	PART NAME	DEWALD PART No.	NOTES
M1	Switch	8017B-1	Band
M2	2 Gang Var. Cap.	2014	(20-455MMF) Each Section
	Knob	4055	
	Cabinet	4053	

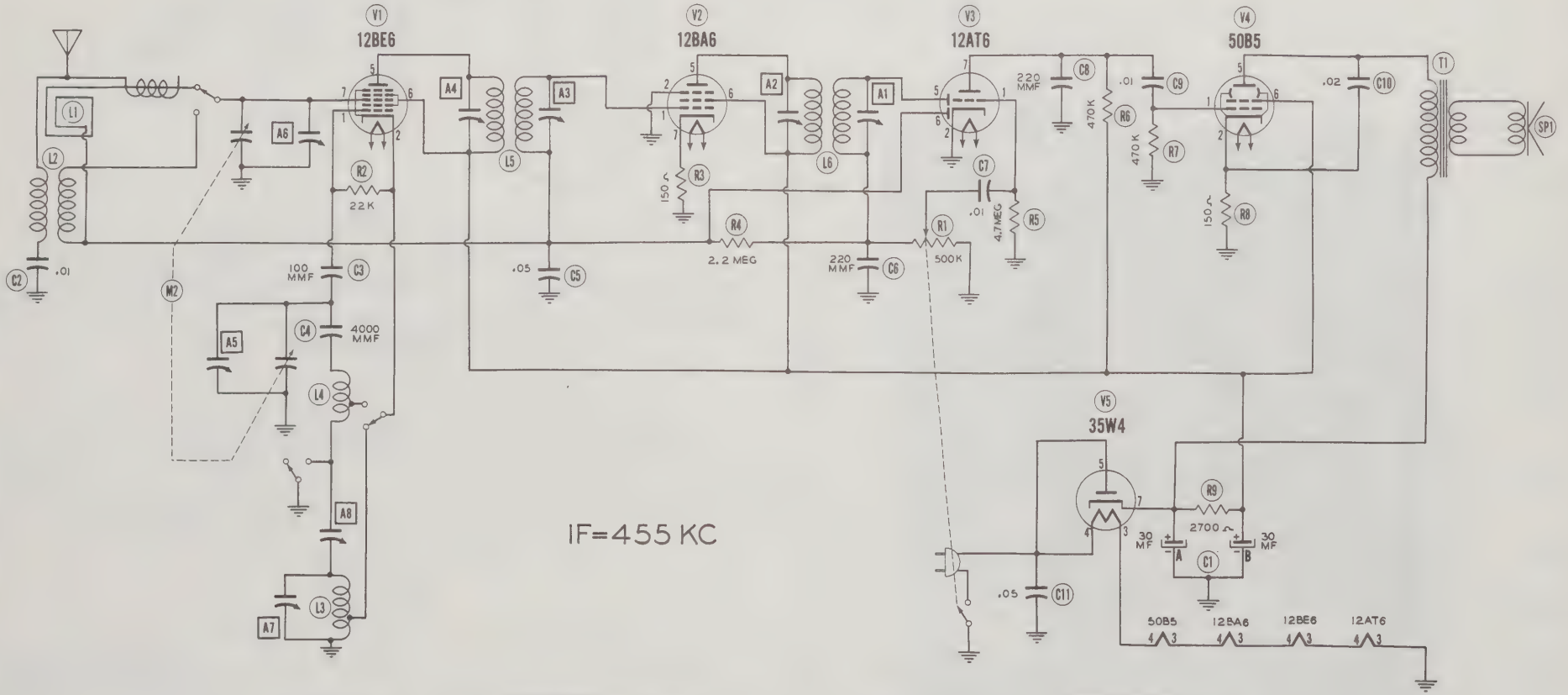


DIAL CORD DRIVE

CHASSIS—BOTTOM VIEW



DATE 6/49 4912-4 SET #64 FOLDER 4



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	§-4.8VDC	0V	25VAC	12VAC	85VDC	87VDC	-1.2VDC
V 2	12BA6	-.5VDC	0V	25VAC	37VAC	90VDC	87VDC	.9VDC
V 3	12AT6	-.7VDC	0V	0V	12VAC	-.8VDC	-.8VDC	36VDC
V 4	50B5	0V	1VDC	37VAC	80VAC	130VDC	87VDC	0V
V 5	35W5	0V	0V	80VAC	117VAC	117VAC	106VAC	135VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.5Ω	25Ω	12Ω	*2.7KΩ	*2.7KΩ	2.7Meg.
V 2	12BA6	2.7Meg.	0Ω	25Ω	38Ω	*2.7KΩ	*2.7KΩ	150Ω
V 3	12AT6	4.7Meg.	0Ω	0Ω	12Ω	500KΩ	2.7Meg.	*470KΩ
V 4	50B5	470KΩ	150Ω	38Ω	90Ω	*180Ω	*2.7KΩ	470KΩ
V 5	35W4	INF.	INF.	90Ω	125Ω	125Ω	110Ω	180KΩ

* Measured from pin 7 of V5

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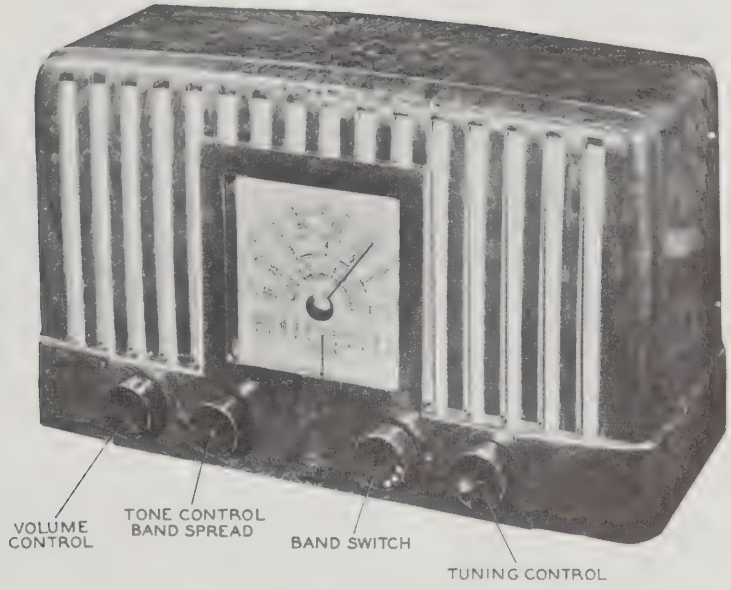
4912-4

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

ECHOPHONE
MODELS EX-102, EX-103



ECHOPHONE MODEL EX-102

TRADE NAME	Echophone, Models EX-102, EX-103
MANUFACTURER	The Hallicrafters Co., 5th & Kostner Avenues, Chicago 24, Illinois.
TYPE SET	AC-DC Operated 3 Band Superheterodyne Receiver with Loop Antenna.
TUBES (FIVE)	Types 12SA7GT Converter, 12SG7 1F Amp., 12SQ7GT DET-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	105-125 or 210-250 Volts AC-DC — RATING .24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1625KC — SHORT WAVE 2.2-7.1MC; 6.9-22MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer parallel with base of dial.

The bandspread tuning should be at zero setting during entire alignment procedure.

The low frequency short wave band must be aligned after the high frequency band has been aligned.

The RMA dummy used consists of a 200MMF capacitor in series with a 20uh. RF choke, the choke being shunted by a 400MMF capacitor in series with a 400Ω carbon resistor.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1MFD	High side to front section of tuning cap. Low side to B-.	455KC	BC (Fully counter-clockwise)	Tuning Cap. fully open.	Across Voice coil.	A1, A2 A3, A4	Adjust for maximum output. If isolation transformer is not used reduce dummy antenna to .001 MFD to reduce hum modulation.
2		Loop	1500KC	"	1500KC	"	A5, A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		Loop	600KC	"	600KC	"	A7	Adjust for maximum output. Repeat step 2.
4	RMA Dummy	High side to ext. ant. terminal. Low side to chassis.	22MC	SW#2 (Fully clockwise)	22MC	"	A8	Loosen set screw on bandspread tuning drive pulley. Set indicator to zero and adjust bandspread tuning (A8) for maximum output. Tighten set screws on pulley.
5	RMA Dummy	High side to ext. ant. terminal. Low side to chassis.	20MC	SW#2 (Fully clockwise)	20MC	Across Voice coil.	A9	Rock tuning cap. and adjust for maximum output.
6	RMA Dummy	High side to ext. ant. terminal. Low side to chassis.	6MC	SW#1 (Center Position)	6MC	"	A10, A11	Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

ECHOPHONE MODEL EX-102

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: ECHOPHONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Converter	12SA7GT	12SA7GT	8AD	
V2	IF Amp.	12SG7	12SG7	8BK	
V3	DET-AVC-AF Amp.	12SQ7GT	12SQ7GT	8Q	
V4	Power Output	50L6GT	50L6GT	7AC	
V5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: ECHOPHONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	150	45B095	AF886D4A	EZ 44315C		DSB -40302 -150	TA-305	Red Filter
1B	30	150					M-25-25	UT-301	Yellow Filter
1C	30	150							Yellow Filter
1D	20	25							Blue Output Plate Byp.
C2	100	500	CM20A101M	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Coupling
C3	47	500	CM20A470M	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Osc. Coupling
C4	.0024	500	CM30A242M	1467-0025	1W5D25	GP2M-0025	MW.5-225		Fixed Padder
C5	.0043	500	CM35A432K	1467-004	1D5D4		MW.5-24		Fixed Padder
C6	.01	600	46AX103F	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Conv. Decoupling
C7	.1	600	46AX104J	P688-1	GT6P1		ST-6-1	72P2	Line Isolation
C8	.05	600	46AY503J	P688-05	GT6S5		ST-6-05	TM-15	Line Isolation
C9	.01	600	46AX103F	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	AVC Filter
C10	100	500	CM20A101M	1468-100	5W5T1	GP1K-100	MO.5-31	1FM-31	IF Coupling
C11	100	500	CM20A101M	1468-100	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Filter
C12	.005	600	46AZ502J	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Tone Comp.
C13	.005	600	46AZ502J	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Audio Coupling
C14	220	500	CM20A221M	1468-00025	5W5T25	GP2K-250	MO.5-325	1FM -325	AF Plate Bypass
C15	.001	600	46AZ102H	P688-001	GT6D1	GP2L-001	ST-6-001	TM-21	Tone Comp.
C16	.01	600	46AX103F	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Audio Coupling
C17	.01	600	46AX103F	P688-01	GT6S1		ST-6-01	TM-11	Output Plate Bypass
C18	.01	600	46AX103F	P688-01	GT6S1		ST-6-01	TM-11	Rect. Bypass

CONTROLS

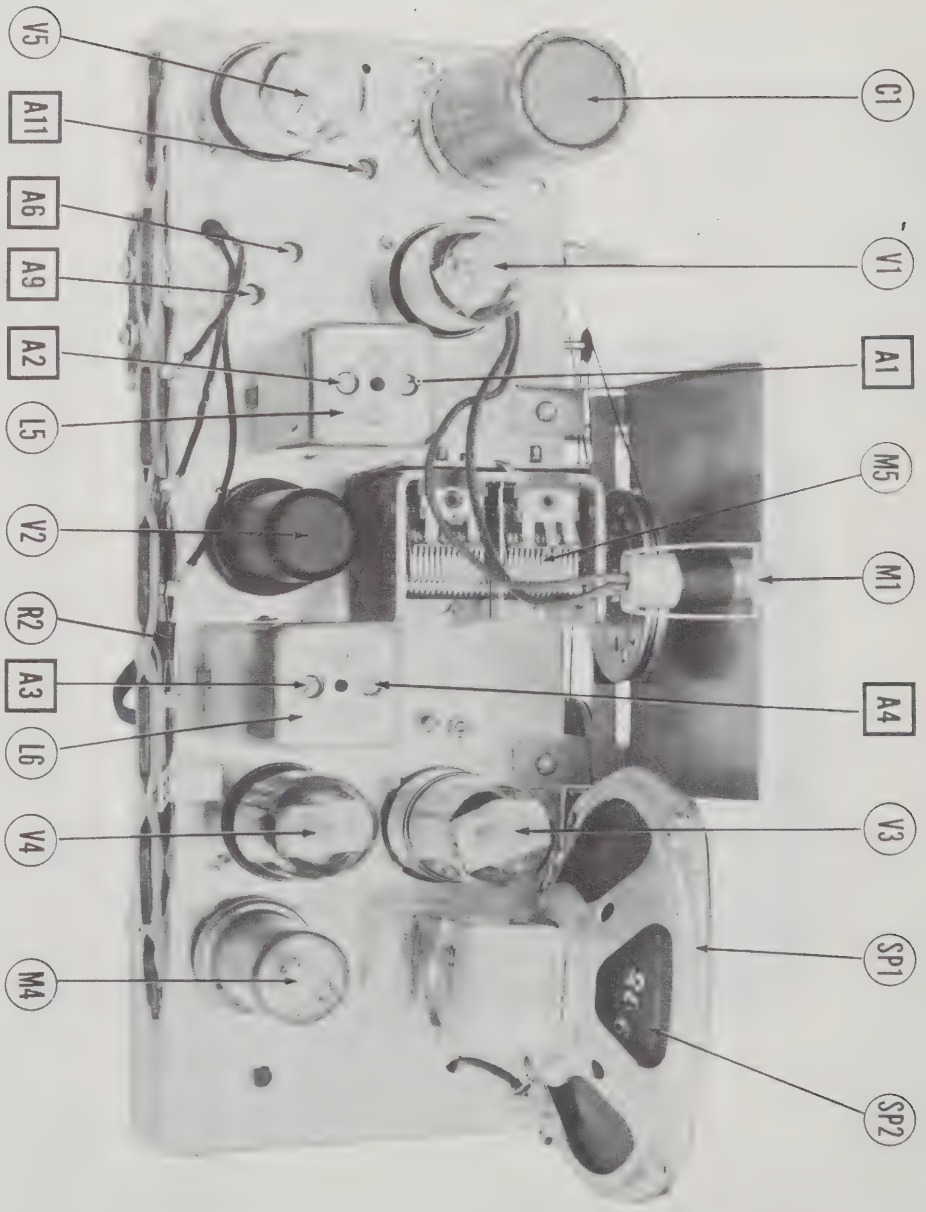
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ECHOPHONE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	2.2 Meg	½	25A561	D18-139XX#	AT-119	Volume control tapped @ 220KΩ
B	Shaft		Not req.	E	KSS-3	Attach to R1A per instr.
C	Switch		Not req.	41	SW-A	Attach to R1A per instr.

#Use 250KΩ tap only.

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ECHOPHONE PART No.	IRC PART No.	IDENTIFICATION CODES
R2	1000Ω	½	RC20AE102M	BTS-1000	Ant. Loading
R3	1 Meg	½	RC20AE105M	BTS-1 Meg	AVC Network
R4	2.2 Meg	½	RC20AE225M	BTS-2.2 Meg	AVC Network
R5	22KΩ	½	RC20AE223M	BTS-22K	Osc. Grid
R6	47Ω	½	RC20AE470M	BW-½-47	Converted Cathode
R7	1000Ω	½	RC20AE102M	BTS-1000	Decoupling
R8	330KΩ	½	RC20AE334M	BTS-330K	Line Isolation
R9	47KΩ	½	RC20AE473M	BTS-47K	Tone Compensation
R10	470KΩ	½	RC20AE474M	BTS-470K	Diode Filter
R11	10 Meg	½	RC20AE106M	BTS-10 Meg	AF Grid
R12	470KΩ	½	RC20AE474M	BTS-470K	AF Plate
R13	470KΩ	½	RC20AE474M	BTS-470K	Output Grid
R14	150Ω	½	RC20AE151M	BW-½-150	Output Cathode
R15	22Ω	1	RC30AE220M		Surge Limiter
R16	220Ω	2		BW-2-220	Filter
R17	680Ω	1	RC30AE681M	BW-1-680	Filter

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		ECHOPHONE PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	2000Ω	2.2Ω	240Ω	.8Ω	58P050-2	A-3876	RS-6	A-2825	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			ECHOPHONE PART No.	JENSEN PART No.	QUAM PART No.	
SP1	FIELD	V.C. IMP.	58B038	ST-112* MOD.P5-X	5A07*	*Fabricate New Mounting Bracket
	PM	3.2Ω				
SP2	CONE DIA.	V.C. DIA.				
	4½"	9/16				

R F COILS

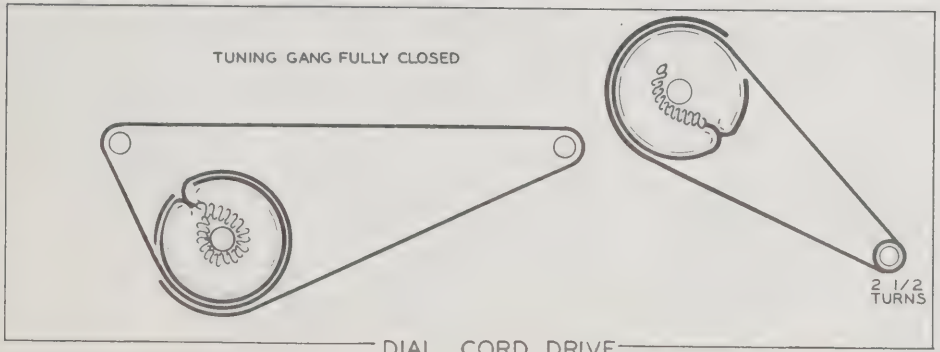
ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	ECHOPHONE PART No.	MEISSNER PART No.
L1	Loop Ant.	.2Ω	1.8Ω	57C104	
L2A	SW Ant.Coil	1Ω	.2Ω	51B814	
2B	SW Ant.Coil	.1Ω	0Ω	51B814	
L3	AM Osc.Coil	5.3Ω		51A811	14-1060
L4A	SW Osc.Coil	0Ω		51B815	
4B	SW Osc.Coil	.1Ω	0Ω	51B815	
L5	Input IF	12Ω	12Ω	50B196-5	16-6618
L6	Output IF	12Ω	12Ω	50B196-2	16-6660

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					ECHOPHONE PART No.		
M1	Bayonet	6-8V	0.15A	Brown	39A004		Type #47

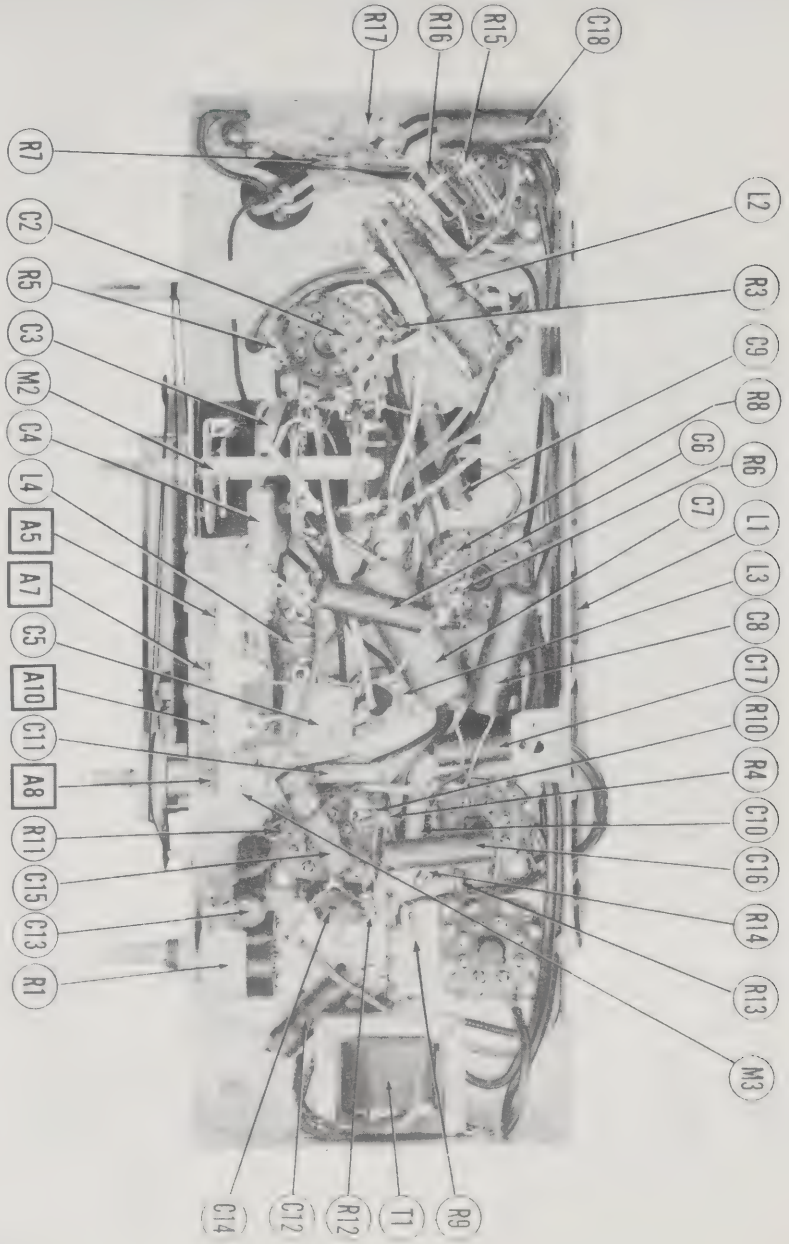
MISCELLANEOUS

ITEM No.	PART NAME	ECHOPHONE PART No.	NOTES
M2	Switch	60B250	Band
M3	Switch	60A246	Tone
M4	Ballast Tube	24B856	
M5	2 Gang Var. Cap.	48B165	(15-450MMF) Each Section
	Trimmer Strip	44B161	A5, A7, A8, A10
	Trimmer Strip	44A162	A6, A9, A11
	Dial Pointer	8DA106	Main Tuning
	Dial Pointer	8DA107	Bandspread
	Dial Scale	58B071	



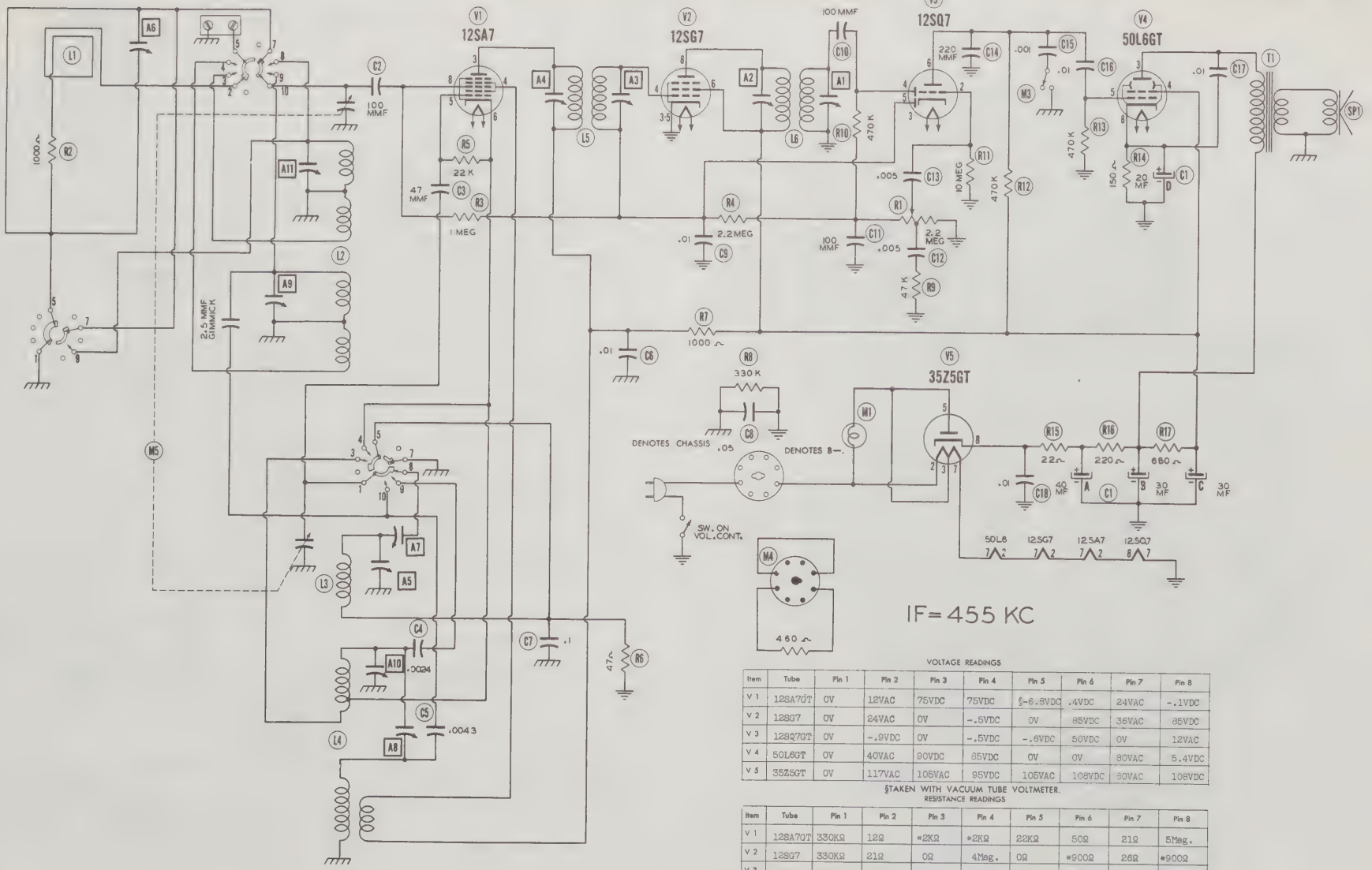
DIAL CORD DRIVE

CHASSIS—BOTTOM VIEW



ECHOPHONE MODEL EX-102

ECHOPHONE MODEL EX-102



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SA7GT	0V	12VAC	75VDC	75VDC	§-6.8VDC	.4VDC	24VAC	-.1VDC
V 2	12SG7	0V	24VAC	0V	-.5VDC	0V	85VDC	36VAC	85VDC
V 3	12SQ7GT	0V	-.9VDC	0V	-.5VDC	-.6VDC	50VDC	0V	12VAC
V 4	50L6GT	0V	40VAC	90VDC	85VDC	0V	0V	80VAC	5.4VDC
V 5	35Z5GT	0V	117VAC	105VAC	95VDC	105VAC	108VDC	80VAC	108VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SA7GT	330KΩ	12Ω	*2KΩ	*2KΩ	22KΩ	50Ω	21Ω	5Meg.
V 2	12SG7	330KΩ	21Ω	0Ω	4Meg.	0Ω	*900Ω	26Ω	*900Ω
V 3	12SQ7GT	330KΩ	10Meg.	0Ω	2.5Meg.	4Meg.	*500KΩ	0Ω	12Ω
V 4	50L6GT	330KΩ	26Ω	*415Ω	*900Ω	500KΩ	INF.	86Ω	150Ω
V 5	35Z5GT	330KΩ	112Ω	108Ω	500KΩ	108Ω	500KΩ	86Ω	500KΩ

* Measured from pin 8 of V5

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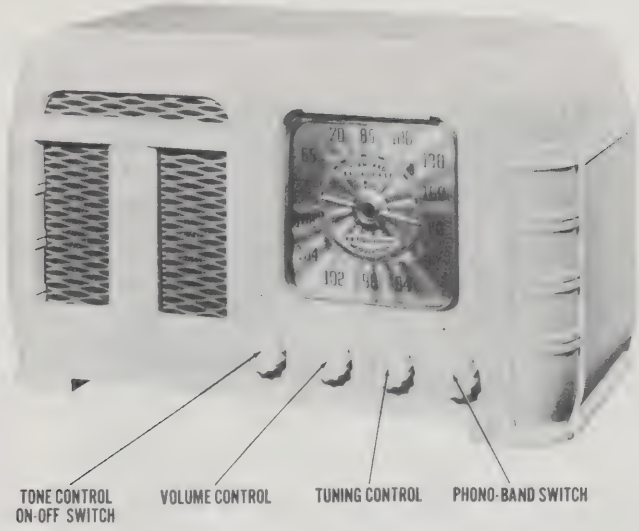
4912-5

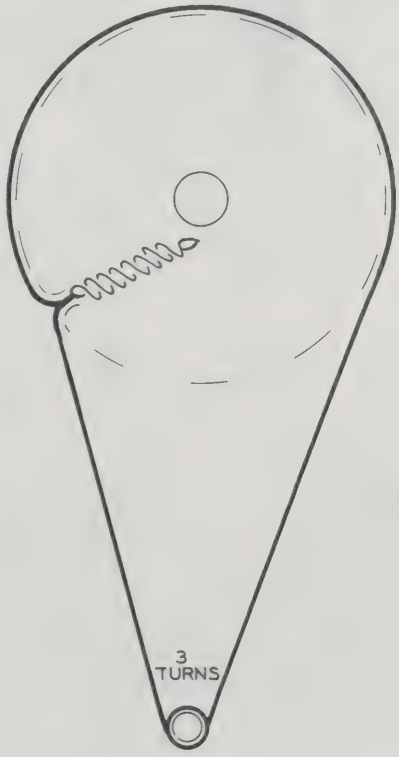
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



FADA MODEL 790

TRADE NAME	Fada, Model 790
MANUFACTURER	Fada Radio & Elect. Co., Inc., 525 Main St., Belleville, New Jersey
TYPE SET	AC-DC Operated AM-FM Superheterodyne Receiver with Loop Antenna
TUBES(EIGHT)	Types 12AT7 FM RF-Mixer, 6BE6 AM Converter-FM Osc.,6BA6 1st IF Amp., 6BA6 FM 2nd IF Amp., 6AL5 Ratio Det., 6AT6 DET-AVC-AF, 25L6GT Power Output, 25Z6GT Rectifier.
POWER SUPPLY	105-125 Volts AC-DC RATING .42 Amp., @ 117 Volts AC
TUNING RANGE-BROADCAST	535-1630KC FREQ. MOD. 87.5-108.5MC

TUNING GANG FULLY CLOSED



DIAL CORD DRIVE

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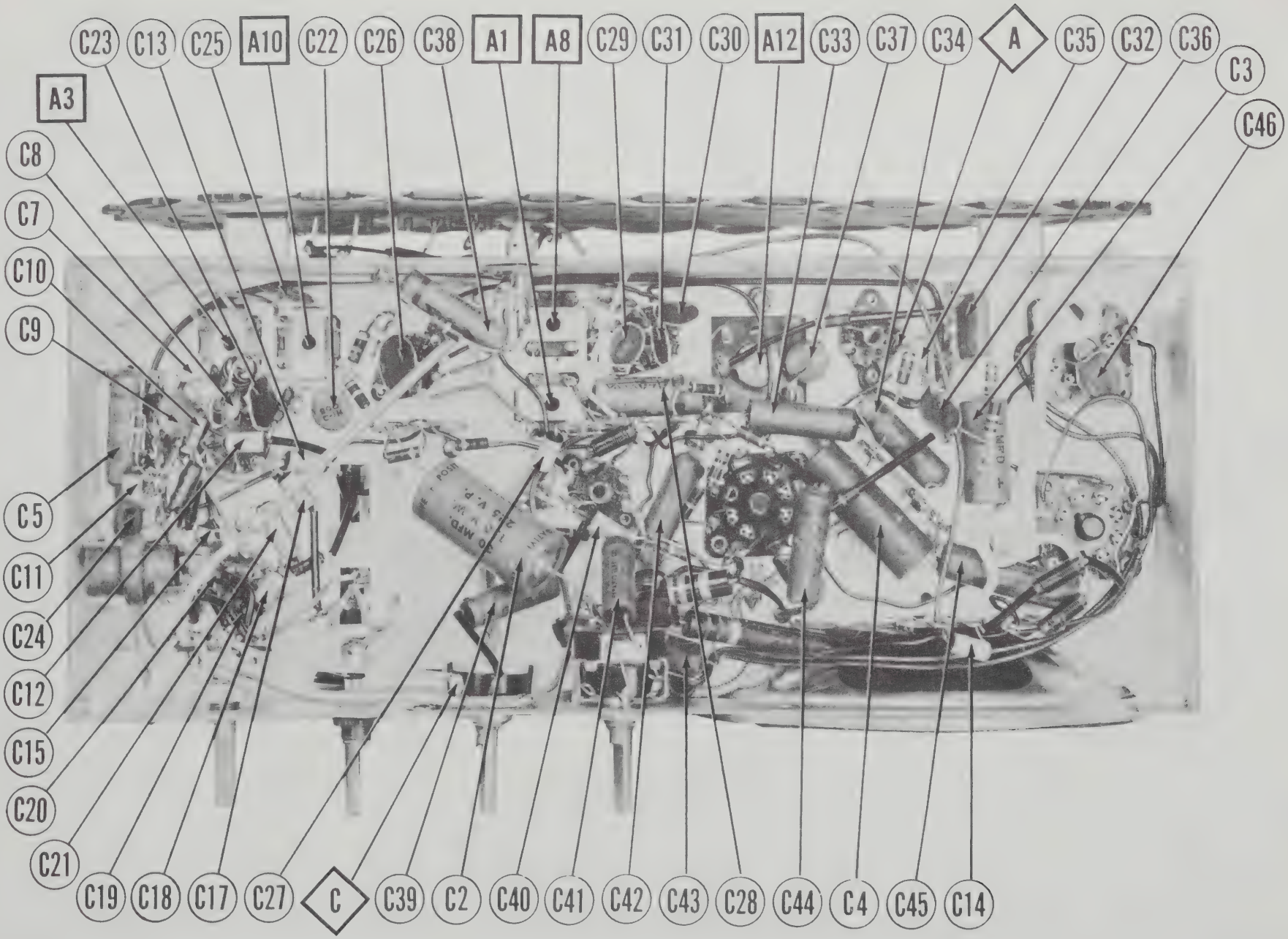
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L10
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M2
L8
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R22
R2
R23
R28
R24
R27
R25
R21

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: FADA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	FM RF Amp.-Mixer	12AT7	12AT7		
V2	AM Converter -FM Osc.	6BE6	6BE6	7CH	
V3	1ST IF Amp.	6BA6	6BA6	7BK	
V4	FM 2nd IF Amp.	6BA6	6BA6	7BK	
V5	Ratio Detector	6AL5	6AL5	6BT	
V6	DET-AVC-AF	6AT6	6AT6	7BT	
V7	Power Output	25L6GT	25L6GT	7AC	
V8	Rectifier	25Z6GT	25Z6GT	7Q	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: FADA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	30	150	22.36	AF888D	UP44415		DY-3x40	EL-340	Filter
B	40	150					-150		■ Filter
C	40	150							▲ Filter
C2	30	150	32.52	PRS150/30	BR3015		M-30-150	UT-301	Decoupling
C3	4	50	22.53	PRS150/4	BR415		M-4-150	TA-55	Stabilizing Cap.
C4	25	25	22.31	PRS25/25	BR252A		M-25-25	TA-25	Output Cath. Bypass
C5	.01	400	12.6	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Ant. Isolation
C6	5000		17.44	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	AVC Filter Note
C7	100		17.21	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Ant. Coupling
C8	500		17.62	1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	RF Cath Bypass
C9	5000		17.45	1467-001	1D5D5	GP2M-005	MW.5-25	1FM-25	AVC Filter
C10	500		17.62	1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	AVC Filter
C11	1500		17.45	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	RF Bypass
C12	100		17.47	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Coupling
C13	100		17.47	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Coupling
C14	100		17.21	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Ant. Coupling
C15	1500		17.45	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	Conv. Fil. Bypass
C16	10	500	17.28	1469-00001	5R5Q1	NP0K-10	MOS.5-41	MS-41	Fixed Trimmer
C17	2		17.59						FM Osc. Coupling
C18	30		17.61	1468-000025	5W5Q3	NP0L-33	MO.5-43	MS-43	Osc. Grid Cap
C19	5		17.79	1468-000005	5W5V5	NP0K-5	MO.5-55	MS-55	FM Osc. Feed Back
C20	2		17.78						FM Osc. Feed Back
C21	1500		17.45	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	Osc. Anode Bypass
C22	5000		17.44	1467-005	1D5D5	GP2M-005	MW.5-215	1FM-25	Conv. Decoupling
C23	10000		17.80	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Conv. Decoupling
C24	5000		17.44	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Conv. Fil. Bypass
C25	10000		17.80	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	AVC Filter
C26	10000		17.80	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	1st IF Decoupling
C27	250		17.81	1468-00025	5W5T25	GP2K-250	MO.5-325	1FM-325	Diode Filter
C28	05	200	12.11	P288-05	GT2S5		ST-4-05	TM-15	AVC Filter
C29	5000		17.44	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	2nd IF Cath Bypass
C30	5000		17.44	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	2nd IF Fil. Bypass
C31	5000		17.44	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	2nd IF Decoupling
C32	270	500	17.57	1468-00025	5W5T5	GP2K-250	MO.5-325	1FM-325	Diode Load Cap
C33	.005	400	12.19	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	De-Emphasis
C34	.01	400	12.6	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Audio Coupling
C35	1500		17.45	1467-0015	1W5T15	GP2L-0015	MW.5-215	1FM-215	RF Bypass
C36	5000		17.44	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	AVC Filter
C37	5000		17.44	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	FM Det. Fil. Bypass
C38	.002	600	12.1	P688-002	GT6D2	GP2M-002	ST-6-002	TM-22	Phono Isolation
C39	.005	400	12.19	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Audio Coupling
C40	250		17.81	1468-00025	5W5T25	GP2K-250	MO.5-325	1FM-325	AF Plate Bypass
C41	.005	400	12.19	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Tone Comp.
C42	.01	400	12.6	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Audio Coupling
C43	.05	400	12.12	P488-05	GT4S5		ST-4-05	TM-15	RF Bypass
C44	.01	400	12.6	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Output Plate Bypass
C45	.05	400	12.12	P488-05	GT4S5		ST-4-05	TM-15	Line Filter
C46	5000		17.44	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Ballast Bypass

NOTE - Not Used In All Models.

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: FADA PART No.	REPLACEMENT DATA: MEISSNER PART No.	
L1	Loop Ant.	1.2Ω		37.193		
L2	RF Choke	0Ω		37.203		3 Turns Around 22Ω Resistor
L3	RF Choke	0Ω		37.206		8 Turns Around 1500Ω Resistor
L4	RF Plate Choke	1.5Ω		37.197		
L5	FM RF Coil	0Ω		37.195		
L6	RF Plate Choke	0Ω		32.205		3 Turns Around 820Ω Resistor
L7	AM Osc. Coil	4.8Ω		37.194	14-1060	
L8	FM Osc. Coil	0Ω		37.195		
L9	RF Choke	1.5Ω		37.197		
L10	RF Choke	0Ω		37.204		3 Turns Around 22Ω Resistor
L11	FM 1st IF	.6Ω	.6Ω	37.112		
L12	AM 1st IF	15Ω	15Ω	37.138	16-6678	
L13	FM 2nd IF	.6Ω	.6Ω	37.132		
L14	AM 2nd IF	15Ω	15Ω	37.138	16-6678	
L15	Ratio Det.	.8Ω	1Ω	37.116		
L16	RF Choke	0Ω		37.134		
L17	RF Choke	0Ω		37.134		
L18	Fil. Choke	0Ω		37.134		
L19	Fil. Choke	0Ω		37.134		

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: FADA PART No.	REPLACEMENT DATA	NOTES
M1	Bayonet	6-8V	0.25A	Blue			Type #44

MISCELLANEOUS

ITEM No.	PART NAME	FADA PART No.	NOTES
M2	Switch	47.15	Band
M3	Ballast Tube	117.24	
M4	Tuning Gang	27.37	▲30-537MMF, 21-202MMF)
	Dial Scale	77.127	
	Dial Pointer	77.126	

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	FADA PART No.	IRC PART No.	CLAROSTAT PART No.	
R1A	500KΩ	½	52.30	D13-133	M-60-Z	Volume control
B	Shaft		Not Req.	A	Not Req.	Attach to R1A per instr.
R2A	500KΩ	½	57.5	D13-133	M-60-Z	Tone control
B	Shaft		Not Req.	A	Not Req.	Attach to R2A per instr.
C	Switch		Not Req.	41	SW-A	Attach to R2A per instr.

RESISTORS

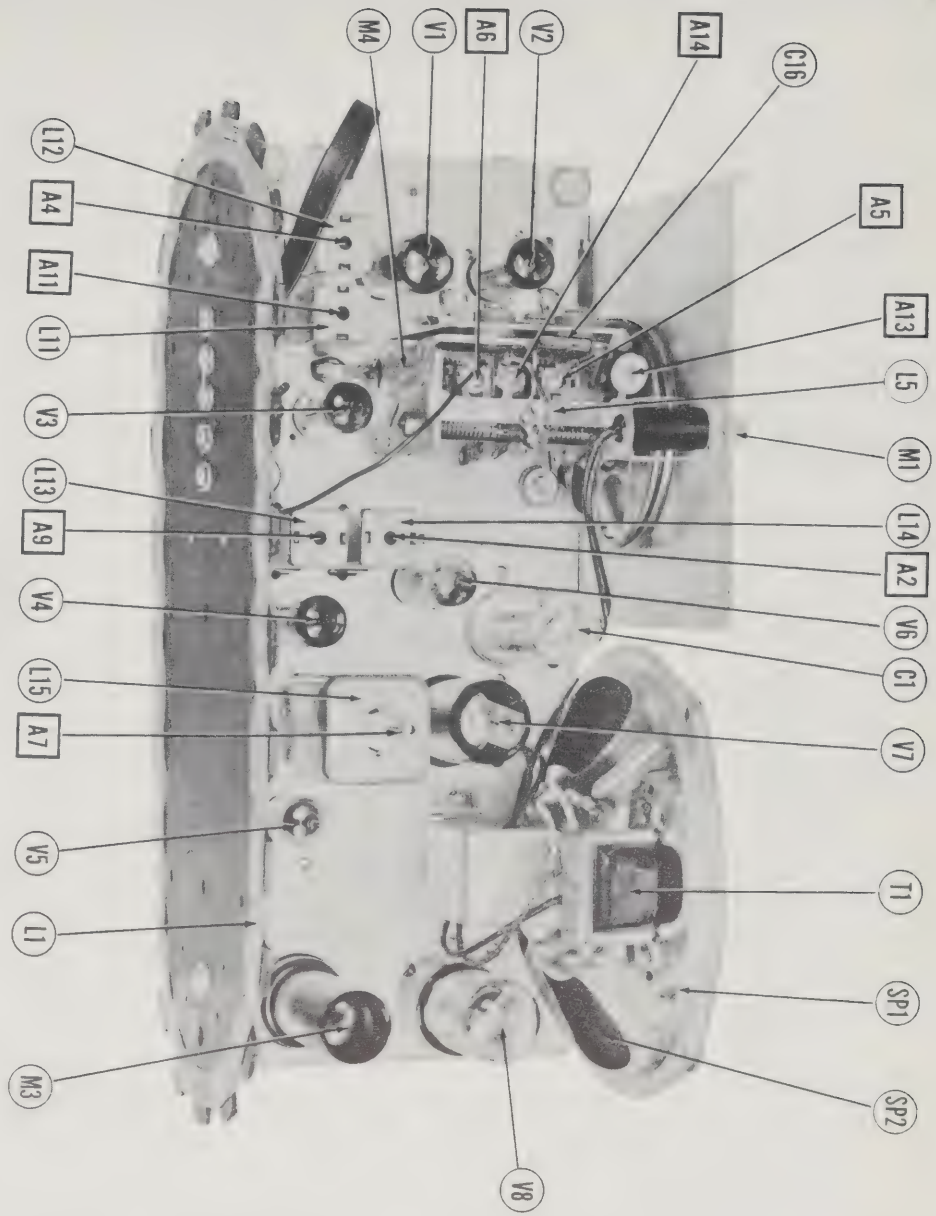
ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	FADA PART No.	IRC PART No.	
R3	220KΩ	½	32.18	BTS-220K	Ext. Ant. Loading
R4	220Ω	½	32.5		FM RF Cathode
R5	470KΩ	½	32.20	BTS-470K	FM RF Grid
R6	2.2 Meg	½	32.24	BTS-2.2 Meg	AVC Network
R7	470KΩ	½	32.20	BTS-470K	FM Mixer Grid
R8	22KΩ	½	32.13	BTS-22K	Osc. Grid
R9	470Ω	½	32.30	BTS-470	Decoupling
R10	1000Ω	½	32.8	BTS-1000	Decoupling
R11	68Ω	½	32.1		IF Cathode
R12	1000Ω	½	32.8	BTS-1000	IF Decoupling
R13	1 Meg	½	32.23	BTS-1 Meg	Diode Filter
R14	330KΩ	½	32.19	BTS-330K	Phono Shunt
R15	68Ω	½	32.1		FM IF Cathode
R16	1000Ω	½	32.8	BTS-1000	FM IF Decoupling
R17	130Ω	½	32.3		Balancing
R18	15KΩ	½	32.12	BTS-15K	DeEmphasis
R19	27KΩ	½	32.85	BTS-27K	Ratio Det. Diode Load
R20	470KΩ	½	32.20	BTS-470K	AVC Network
R21	10 Meg	½	32.99	BTS-10 Meg	Delayed AVC Network
R22	10 Meg	½	32.99	BTS-10 Meg	AF Grid
R23	220KΩ	½	32.18	BTS-220K	AF Plate
R24	100Ω	½	32.2		Parasitic Suppressor
R25	470KΩ	½	32.20	BTS-470K	Output Grid
R26	150Ω	½	32.4	BW-½-150	Output Cathode
R27	200Ω	2	32.40	BW-2-220	Filter
R28	680Ω	1	32.15	BTA-680	Filter

TRANSFORMER (OUTPUT)

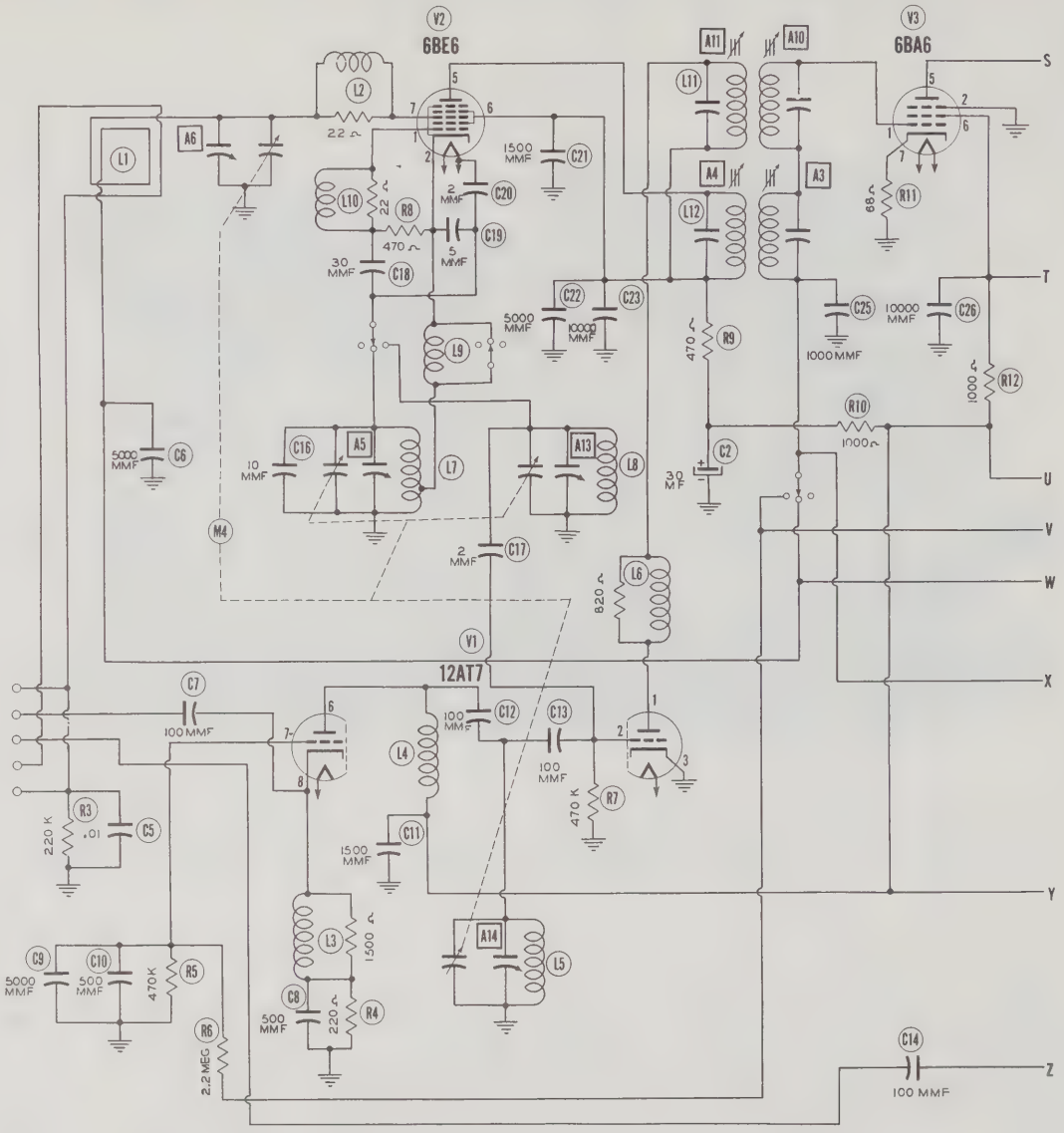
ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		FADA PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	1900Ω	3.5Ω	144Ω	.4Ω	Part of 107.24	A-3876	RO-2	A-2928	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	V.C. IMP.	FADA PART No.	JENSEN PART No.	QUAM PART No.	
SP1	5W	3.5Ω	107.24	ST-108* MOD.P6-X	6A1*	*Mount on original bracket or fabricate new mounting bracket.
SP2	CONE DIA. 5-7/8"	V.C. DIA. 9/16"				



DATE 6/49 4912-6 SET #64 FOLDER #6



IF=456 KC AM

IF=10.7 MC FM

VOLTAGE READINGS

	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
‡	V1	12AT7	75VDC	-.6VDC	0V	12VAC	12VAC	90VDC	0V	.8VDC	6.3VAC
‡	V2A	6BE6	§-2.3VDC	0V	0V	6.3VAC	75VDC	75VDC	-.7VDC		
	V2B	6BE6	§-9VDC	0V	0V	6.3VAC	75VDC	75VDC	-.5VDC		
	V3	6BA6	-.5VDC	0V	32VAC	25VAC	80VDC	80VDC	.7VDC		
‡	V4	6BA6	0V	0V	38VAC	32VAC	80VDC	80VDC	.7VDC		
‡	V5	6AL5	0V	-1.4VDC	19VAC	12VAC	-1.4VDC	0V	-.5VDC		
	V6	6AT6	-.6VDC	0V	19VAC	25VAC	-.4VDC	-.5VDC	55VDC		
	V7	25L6GT	0V	60VAC	108VDC	90VDC	0V	0V	38VAC	5.5VDC	
	V8	25Z6GT	0V	85VAC	117VAC	130VDC	117VAC	0V	60VAC	130VDC	

§TAKEN WITH VACUUM TUBE VOLTMETER.

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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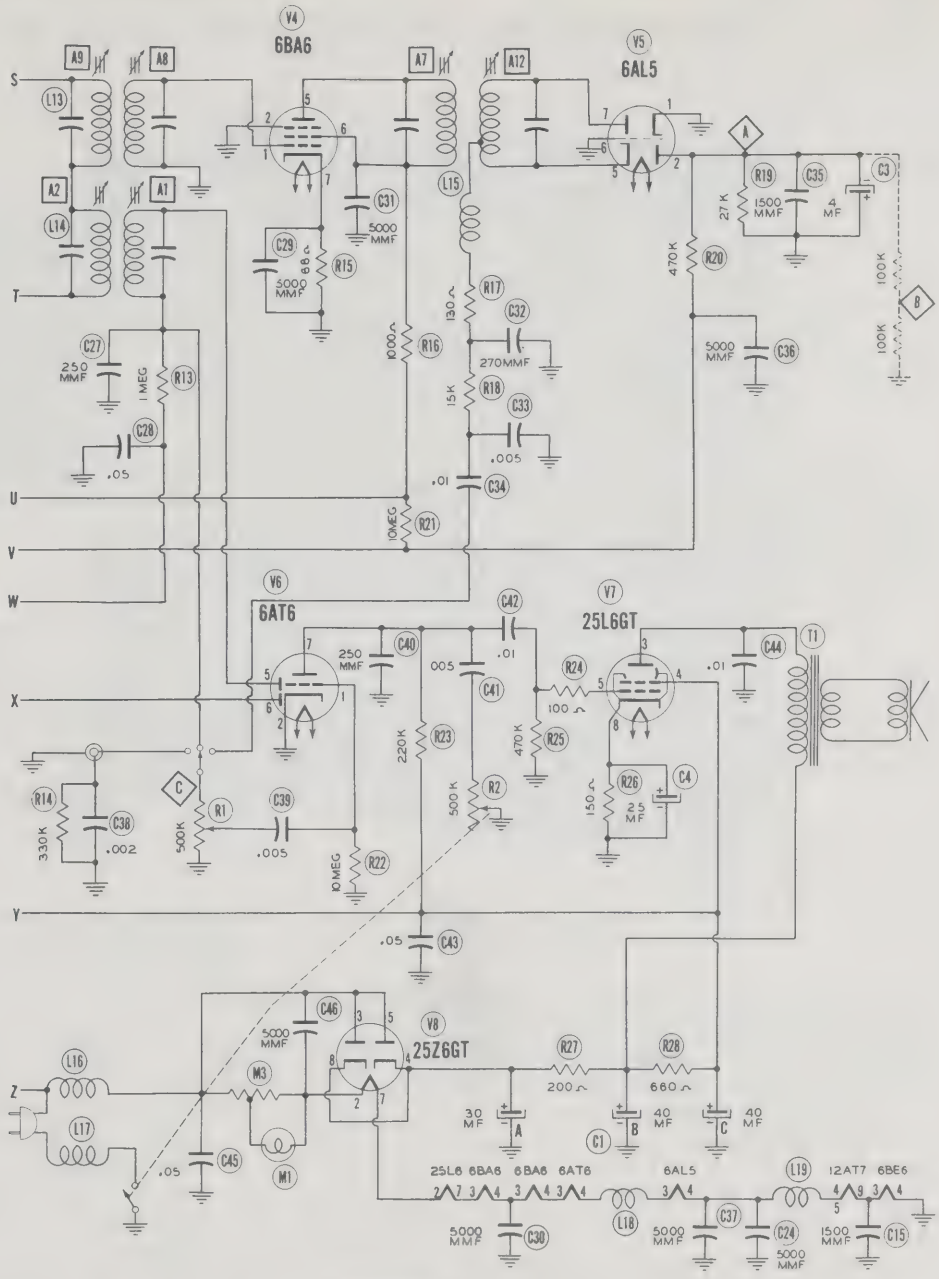

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
‡	V1									
‡	V2									
	V3									
	V4									
‡	V5									
‡	V6									
	V7									
	V8									

* Measured from pin 3 of V6

‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap fully closed and set pointer parallel with base of dial.

Use isolation transformer if available. If not, connect a .1MFD capacitor in series with low side of signal generator and chassis.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (Grid) 6BE6 (V2). Low side to chassis.	455KC	BC (center pos.)	Tuning cap fully open.	Across voice coil	A1,A2 A3,A4	Adjust for maximum output. If isolation transformer is not used reduce dummy antenna to .001MFD to reduce hum modulation.
2.	200MMF	High side to terminal 4 of antenna terminal strip. Low side to chassis.	1630KC	"	"	"	A5	Adjust for maximum output.
3.	200MMF	"	1500KC	"	Tune for maximum signal.	"	A6	Adjust for maximum output. Check Tracking at 600KC. Bend plates of RF Section of tuning cap. if necessary.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (± 5%) resistor in series from pin 2 of 6AL5 (V5) to chassis. The junction of these two resistors is point (B) as designated on schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.01MFD	High side to pin 1 (Grid) 6BA6 (V4). Low side to chassis.	10.7MC	FM (fully clockwise).	Midscale	DC Probe to Point (A) Common to chassis.	A7	Adjust for maximum deflection.
5.	.01MFD	High side to pin 1 (Grid) 6BA6 (V3). Low side to chassis.	"	"	"	"	A8	Connect shunt of 680Ω (carbon) across primary of L13 and adjust A8 for maximum deflection.
6.	.01MFD	"	"	"	"	"	A9	Reconnect shunt across the secondary and adjust A9 for maximum deflection
7.	.01MFD	High side to pin 2 (Grid) 12AT7 (V1). Low side to chassis.	"	"	"	"	A10, A11	Adjust for maximum deflection. Retouch adjustment of A7.
8.	.01MFD	"	"	"	"	DC Probe to Point (C) Common to Point (B)	A12	Adjust for zero reading. A positive & negative reading is obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	.01MFD	High side to pin 2 (Grid) 12AT7 (V1). Low side to chassis	10.7MC (450KC Sweep)	10.7MC	FM	Vert. Amp. to Point (A) Low side to chassis.	A7, A8 A9,A10, A11	Disconnect stabilizer capacitor (C3). Adjust A7 thru A11 for maximum amplitude & symmetry as per Fig. 1.
5.	.01MFD	"	"	"	"	Vert. Amp. to Point (C) Low side to chassis.	A12	Reconnect stabilizer cap. Adjust A12 for correct crossover point as per Fig 2. Slightly retouch A7 for maximum amplitude and straightness of crossover lines. Continue with step 9.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
9.	Two 130Ω carbon res.	Insert 130Ω resistor in series with each lead and connect across terminals 1 & 2 of antenna terminal strip.	108MC	"	108MC	DC Probe to Point (A) Common to chassis.	A13	Starting from minimum capacity, adjust A13 for maximum deflection at first peak obtained.
10.	"	"	88MC	"	88MC	"	A14	Adjust for maximum deflection.

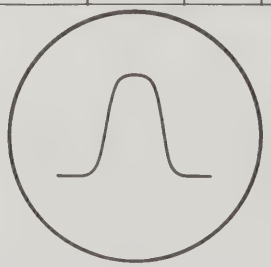


FIG. 1

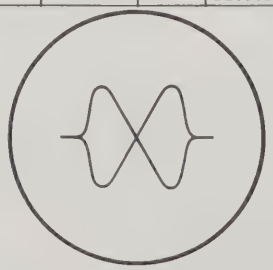
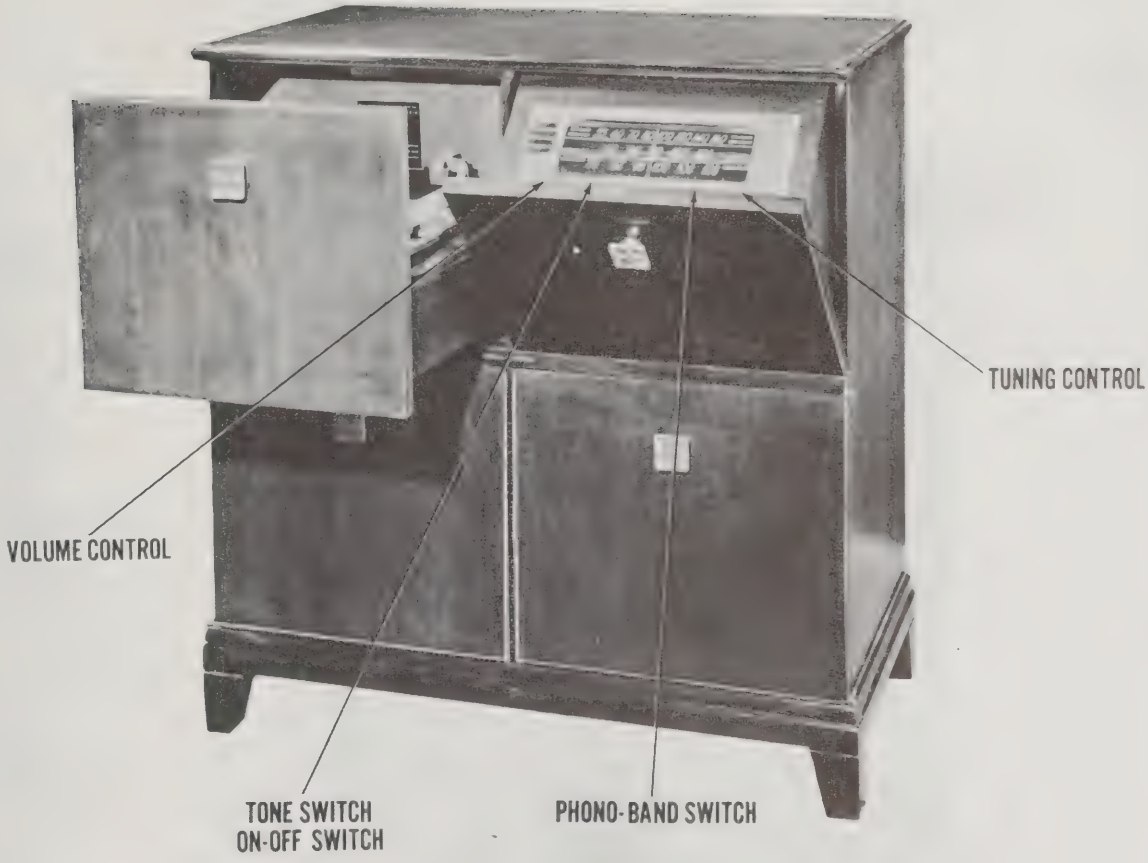


FIG. 2

GENERAL ELECTRIC
MODELS 324, 328



GENERAL ELECTRIC
MODELS 324, 328

GENERAL ELECTRIC MODEL 324

TRADE NAME	General Electric, Models 324, 328
MANUFACTURER	General Electric Co., Electronics Dept., Electronics Park, Syracuse, New York
TYPE SET	AC Operated Combination Phono-Radio, AM-FM Superheterodyne Receiver with Loop Antenna
TUBES(EIGHT)	Types 6BE6 Converter, 6BA6 FM RF-1st IF Amp., 6BA6 2nd IF Amp., 6AU6 Limiter, 6T8 DET-AVC-AF, 6SC7 Phono Pre-Amp., 6V6GT Power Output, 5Y3GT Rectifier
POWER SUPPLY	105-125 Volts AC RATING .58 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1620KC FREQ. MOD. 88-108MC

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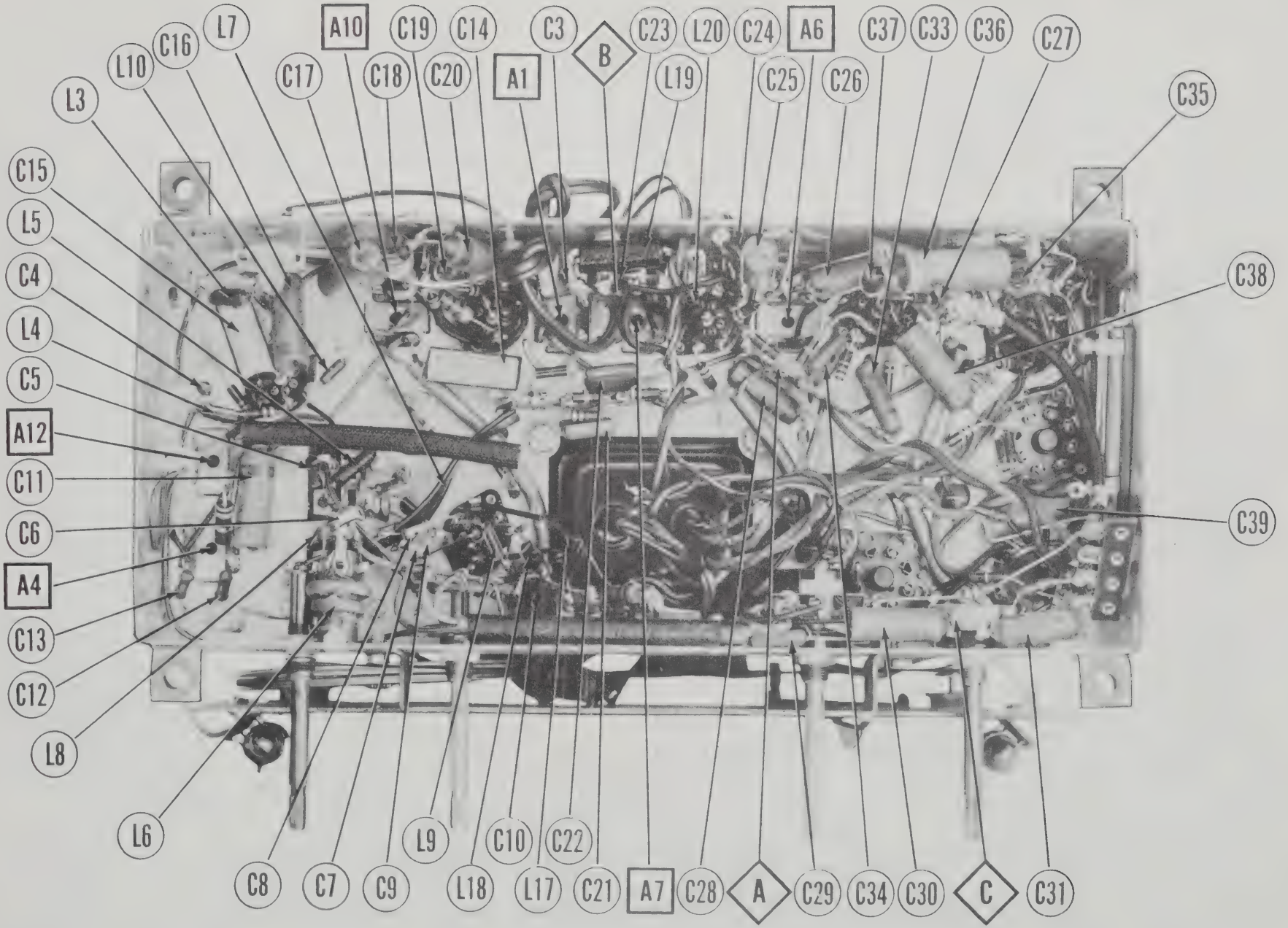
L7
A10
C19
C14
C3
B
C23
L20
C24
A6
C37
C33
C36
C27
C16
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C17
C18
C20
A1
L19
C25
C26
C35
L3
C15
L5
C4
L4
C5
A12
C11
C6
A4
C13
C12
L8
C38
C39
L6
L9
C10
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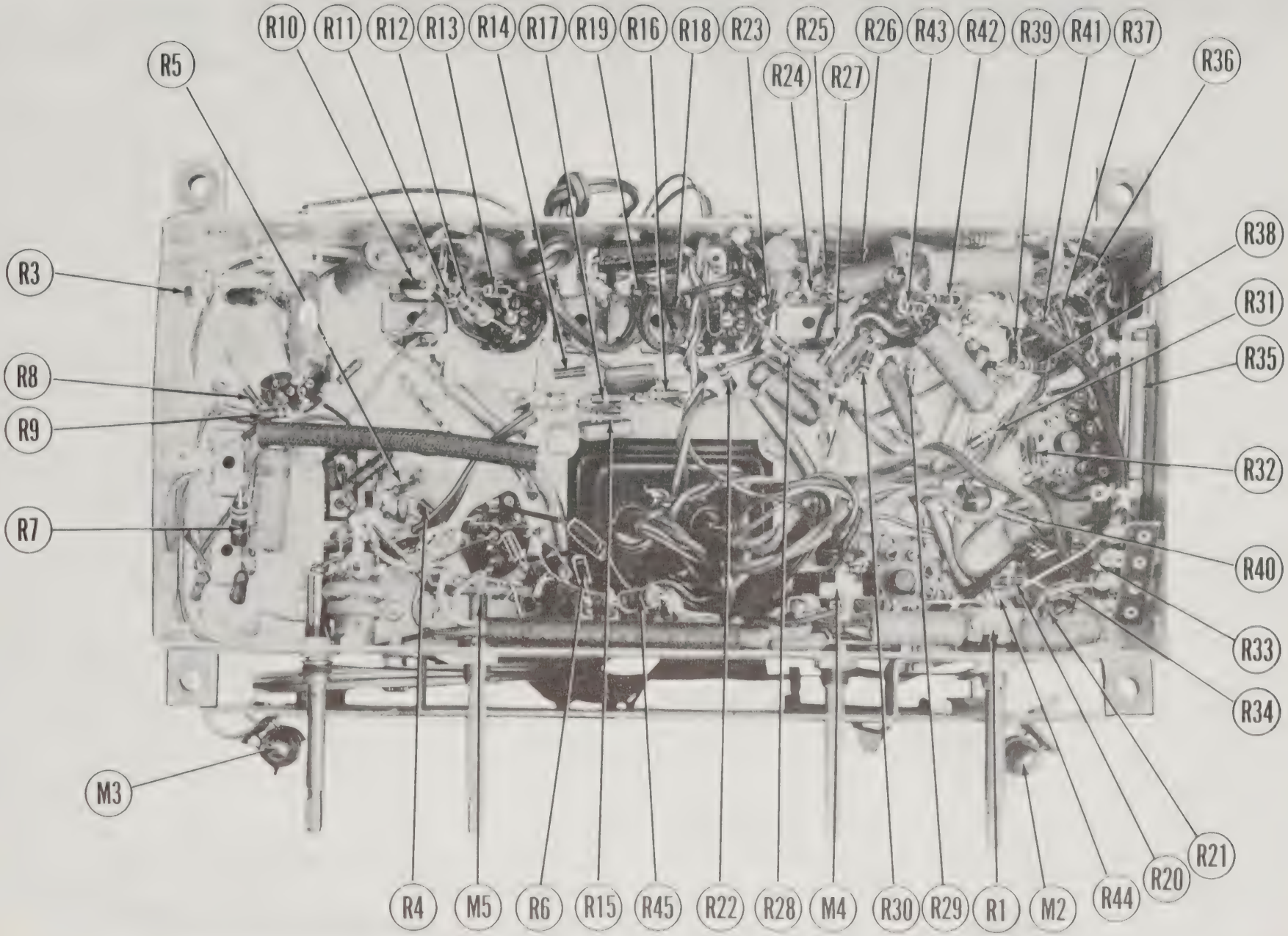
L17
C21
A7
C28
A
C29
C34
C30
C
C31


R10
R11
R12
R13
R14
R17
R19
R16
R18
R23
R25
R26
R43
R42
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R37
R5
R24
R27
R36
R38
R3
R31
R8
R35
R9
R32
R7
R40
R33
R34
M3
R21
R20
R4
M5
R6
R15
R45
R22
R28
M4
R30
R29
R1
M2
R44

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: G. E. PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Converter	6BE6	6BE6	7CH	
V2	FM RF-1st IF Amp.	6BA6	6BA6	7BK	
V3	2nd IF Amp.	6BA6	6BA6	7BK	
V4	Limiter	6AU6	6AU6	7BK	
V5	DET.-AVC-AF Amp.	6T8	6T8		
V6	Phono Pre-Amp.	6SC7	6SC7	8S	
V7	Power Output	6V6GT	6V6GT	7AC	
V8	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: G. E. PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	30	400	RCE-029	AF862J4A	UP431		DY-403	EL-424	■ Filter
B	30	400			45C				● Filter
C	15	400							▲ Filter
D	20	25							Output Cath. Bypass
C2	10	250	RCE-042	PRS250/12	BR1225		M-10-350	EL-10	Decoupling
C3	47	500	UCU-020	1468-00005	5W5Q5		MO.5-45	1FM-45	Ant. Coupling
C4	3		RCW-1066			NPOK-3			RF Coupling ± 10%
C5	10		RCW-1060	1468-00001	5W5Q1	GP1K-10	MO.5-41	MS-41	" "
C6	22		RCW-1053	1468-000025	5W5Q2	GP1K-25	MOS.5-42	MS-42	Osc. Grid Cap.
C7	47		RCW-1043	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	" " "
C8	39		RCW-1057	1469-00004	5R5Q4		MOS.5-44	MS-44	Osc. Feedback ±10%
C9	8		RCW-2033						" " "
C10	.01	600	UCC-630	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Osc. Anode Bypass
C11	.01	600	UCC-630	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Conv. Plate Decoupling
C12	470		RCW-176	1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	" " "
C13	470		RCW-176	1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	AVC Filter
C14	.05	200	UCC-635	P288-05	GT2S5		ST-4-05	TM-15	" "
C15	.05	200	UCC-635	P288-05	GT2S5		ST-4-05	TM-15	RF & 1st IF Cath. Byp.
C16	.01	600	UCC-630	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	RF & 1st IF Screen Byp.
C17	.02	600	UCC-631	P688-02	GT6S2		ST-6-02	TM-12	RF & 1st IF Plate Dec.
C18	.05	200	UCC-635	P288-05	GT2S5		ST-4-05	TM-15	2nd IF Cath. Bypass
C19	.01	600	UCC-630	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	2nd IF Screen Bypass
C20	.02	600	UCC-631	P688-02	GT6S2		ST-6-02	TM-12	2nd IF Plate Decoupling
C21	47	500	UCU-020	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Diode Filter
C22	47	500	UCU-020	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	" "
C23	.05	400	UCC-635	P488-05	GT4S5		ST-4-05	TM-15	Limiter Grid Filter
C24	47		RCW-2010	1469-00005	5R5Q5	NPOM-50	MOS.5-45	1FM-45	Fixed Trimmer ±5%
C25	.01	600	UCC-630	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Limiter Screen Bypass
C26	.01	600	UCC-630	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Limiter Plate Decoupling
C27	470	500	UCU-044	1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	RF Bypass
C28	.001	200	UCC-620	P688-001	GT6D1	GP2L-001	ST-6-001	TM-21	De-emphasis
C29	47	500	UCU-020	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	RF Bypass
C30	.01	600	UCC-630	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Audio Coupling
C31	.007	600	RCC-001	P688-0075	GT6D6	GP2-335-0075	ST-6-006	TM-26	Tone Comp.
C32	.002	600	UCC-621	P688-002	GT6D2	GP2M-002	ST-6-002	TM-22	" "
C33	.003	200	UCC-623	P688-003	GT6D3	GP2M-003	ST-6-003	TM-23	Audio Coupling
C34	47	500	UCU-020	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	AF Plate Bypass
C35	.05	200	UCC-635	P288-05	GT2S5		ST-4-05	TM-15	Audio Coupling
C36	.05	600	UCC-635	P688-05	GT6S5		ST-6-05	TM-15	" "
C37	.01	600	UCC-630	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Tone Comp.
C38	.02	600	UCC-631	P688-02	GT6S2		ST-6-02	TM-12	Audio Coupling
C39	.005	1600	UCC-1625	P1688-005	GT16D5		STM-16-005	MB-25	Output Plate Bypass

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: G. E. PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	2 Meg.	½	RRC-074	D18-139X	AT-116	Volume control tapped @ 1 Meg.
B	Shaft		Not Req.	E	KSS-3	Attach to R1A Per Instructions

PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: G. E. PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	V. C. IMP.		ST-102*		* Replace output transformer to match 6-8Ω voice coil.
SP1	PM	3.4Ω	U0P-1247	MOD.P12-S	12A4*	
	CONE DIA.	V. C. DIA.				
SP2	11 3/4"	1"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: G. E. PART No.	MEISSNER PART No.
L1	FM Dipole Ant.	0Ω			
L2	AM Loop Ant.	2Ω		RLL-030	
L3	RF Choke	.1Ω		RLI-005	
L4	FM Ant.Choke	0Ω		RLI-056	
L5	RF RF Coil	0Ω		RLB-027	
L6	AM Osc. Coil	8.8Ω		RLC-066	14-1060
L7	FM Osc. Coil	0Ω		RLC-067	
L8	RF Choke	1Ω		RLA-012	
L9	RF Choke	.1Ω		RLI-057	
L10	RF Choke	.1Ω		RLI-057	
L11	FM 1st IF	.5Ω	.5Ω	RTL-080	
L12	AM 1st IF	16Ω	16Ω	RTL-078	16-6678
L13	FM 2nd IF	.5Ω	.5Ω	RTL-080	
L14	FM 3rd IF	.5Ω	.5Ω	RTL-080	
L15	AM 2nd IF	13Ω	12Ω	RTL-054	16-6678
L16	FM Disc.XFMR	.6Ω	.9Ω	RTD-006	
L17	Fil. Choke	.1Ω		RLI-005	
L18	Fil. Choke	.1Ω		RLI-005	
L19	Line Choke	.1Ω		RLI-044	
L20	RF Limiter Chk.	.6Ω		RLI-058	

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: G. E. PART No.	REPLACEMENT DATA	NOTES
M1	Bayonet	6-8V	0.15A	Brown			Type #47
M2	Bayonet	6-8V	0.15A	Brown			Type #47
M3	Bayonet	6-8V	0.15A	Brown			Type #47

MISCELLANEOUS

ITEM No.	PART NAME	G. E. PART No.	NOTES
M4	Switch	RSW-048	On/off-Tone
M5	Switch	RSW-059	Band
M6	2 Gang Var. Cap.	RCT-033	(28-487MMF, 12-130MMF)
A14	Trimmer	RLY-034	BC Ant. Adj.
A15	Trimmer	RCY-038	FM Osc. Adj.
A17	Trimmer	RCY-020	FM Ant. Adj.
	Cabinet	RAV-058	Model 324
	Cabinet	RAV-060	Model 328
	Dial Scale	RDS-074	
	Dial Pointer	RDX-035	
	Knob	RDK-037	Plain (Model 328)
	Knob	RDK-040	with Arrow (Model 328)
	Knob	RDK-137	with Arrow (Model 324)
	Knob	RDK-138	Plain (Model 324)

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	G. E. PART No.	IRC PART No.	
R2	470Ω	½	URD-041	BTS-470	Ant. Loading
R3	33KΩ	½	URD-085	BTS-33K	" "
R4	100Ω	½	URD-025		Parasitic Suppressor
R5	22KΩ	½	URD-081	BTS-22K	Osc. Grid
R6	4700Ω	½	URD-065	BTS-4700	Osc. Anode
R7	6800Ω	1	URD-069	BTA-6800	Converter Plate Decoupling
R8	68Ω	½	URD-021		RF IF Cathode
R9	4700Ω	½	URD-065	BTS-4700	RF IF Screen Decoupling
R10	2200Ω	½	URD-057	BTS-2200	RF IF Plate Decoupling
R11	68Ω	½	URD-021		2nd IF Cathode
R12	10KΩ	1	URD-073	BTA-10K	2nd IF Screen Decoupling
R13	6800Ω	½	URD-069	BTS-6800	2nd IF Plate Decoupling
R14	2.2 Meg.	½	URD-129	BTS-2.2 Meg.	AVC Network
R15	47KΩ	½	URD-089	BTS-47K	Diode Filter
R16	47KΩ	½	URD-089	BTS-47K	" "
R17	220KΩ	½	URD-105	BTS-220K	Diode Load
R18	10Ω	½	URD-001		Parasitic Suppressor
R19	1 Meg.	½	URD-121	BTS-1 Meg.	Limiter Grid
R20	100KΩ	½	URD-097	BTS-100K	Tone Compensation
R21	100Ω	½	URD-025	BW-½-100	Series Vol. Control
R22	47KΩ	½	URD-089	BTS-47K	Limiter Cathode
R23	47KΩ	½	URD-089	BTS-47K	Limiter Screen Decoupling
R24	22KΩ	½	URD-081	BTS-22K	Limiter Plate Decoupling
R25	120KΩ	½	URD-099	BTS-120K	Disc. Load
R26	120KΩ	½	URD-099	BTS-120K	" "
R27	100KΩ	½	URD-097	BTS-100K	De-emphasis
R28	150KΩ	½	URD-101	BTS-150K	Tone Compensation
R29	6.8 Meg.	½	URD-141	BTS-6.8 Meg.	AF Grid
R30	470KΩ	½	URD-113	BTS-470K	AF Plate
R31	470KΩ	½	URD-113	BTS-470K	Output Grid
R32	1000Ω	½	URD-049	BTS-1000	" "
R33	330Ω	1	URE-037	BTA-330	Output Cathode
R34	1500Ω	½	URD-053	BTS-1500	Feedback
R35A	1220Ω	10	RRT-003	AB-1250	Filter
B	6500Ω			AB-6000	"
R36	6800Ω	½	URD-069	BTS-6800	Phono Shunt
R37	3.3 Meg.	½	URD-133	BTS-3.3 Meg.	Phono Pre-Amp. Grid
R38	68KΩ	½	URD-093	BTS-68K	Phono Pre-Amp. Plate
R39	33KΩ	½	URD-085	BTS-33K	" " " "
R40	33KΩ	½	URD-085	BTS-33K	" " " "
R41	3.3 Meg.	½	URD-133	BTS-3.3 Meg.	Phono Pre-Amp. Grid
R42	200KΩ	½	URD-1104		Tone Compensation 5% Tol.
R43	27KΩ	1	URE-083	BTA-27K	" "
R44	47KΩ	½	URD-089	BTS-47K	" "
R45	2.2Ω	1	RRN-006	BW-1-2.2	Series Pilot Light

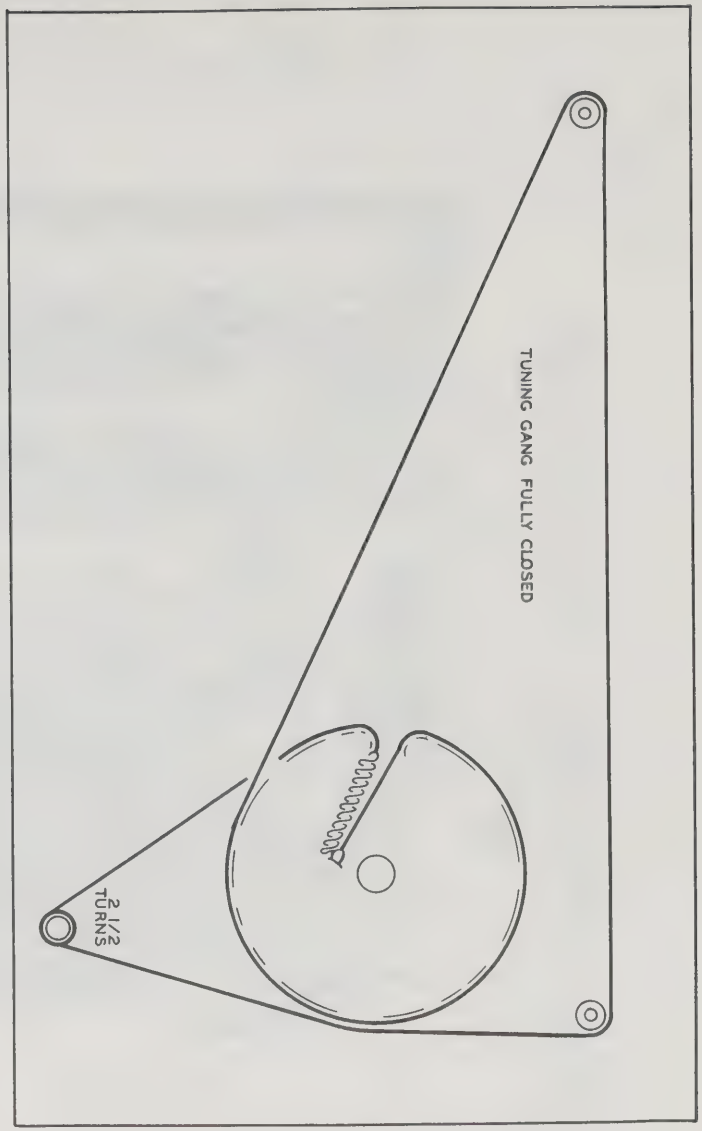
TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	G. E. PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1	117VAC @ .58A	550VCT .072ADC	5VAC @ 2A	6.6VAC @ 2.5A SEC. 4 6.6VAC @ .3A	RTP-061		PH-50A†	

† Drill new mounting hole.

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		G. E. PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	6200Ω	3.4Ω	520Ω	.5Ω	RTO-041	A-3850	RO-302	A-2931	



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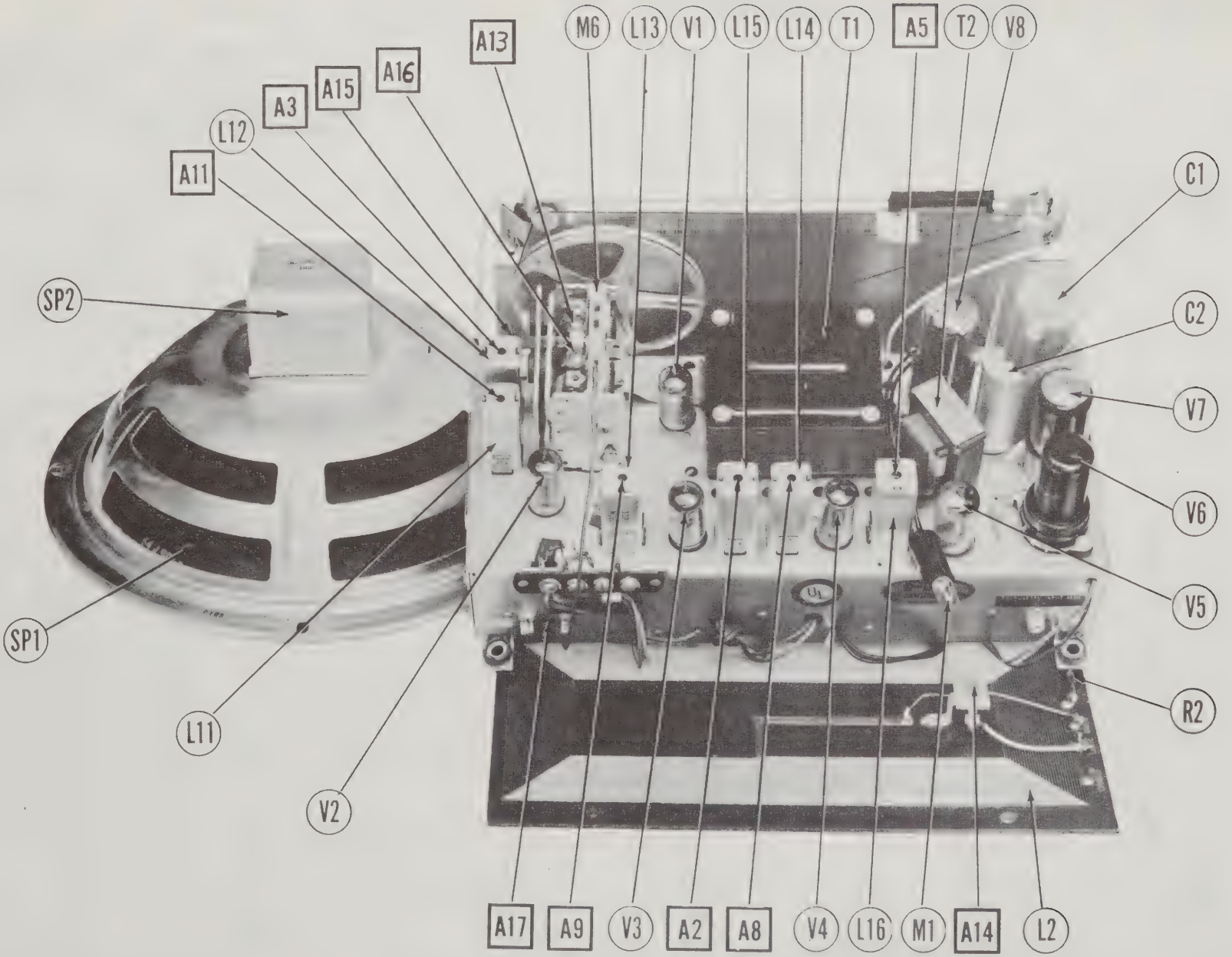
M6
L13
V1
L15
L14
T1
A5
T2
V8
A13
A16
A15
A3
L12
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C1
SP2
C2
V7
V6
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M1
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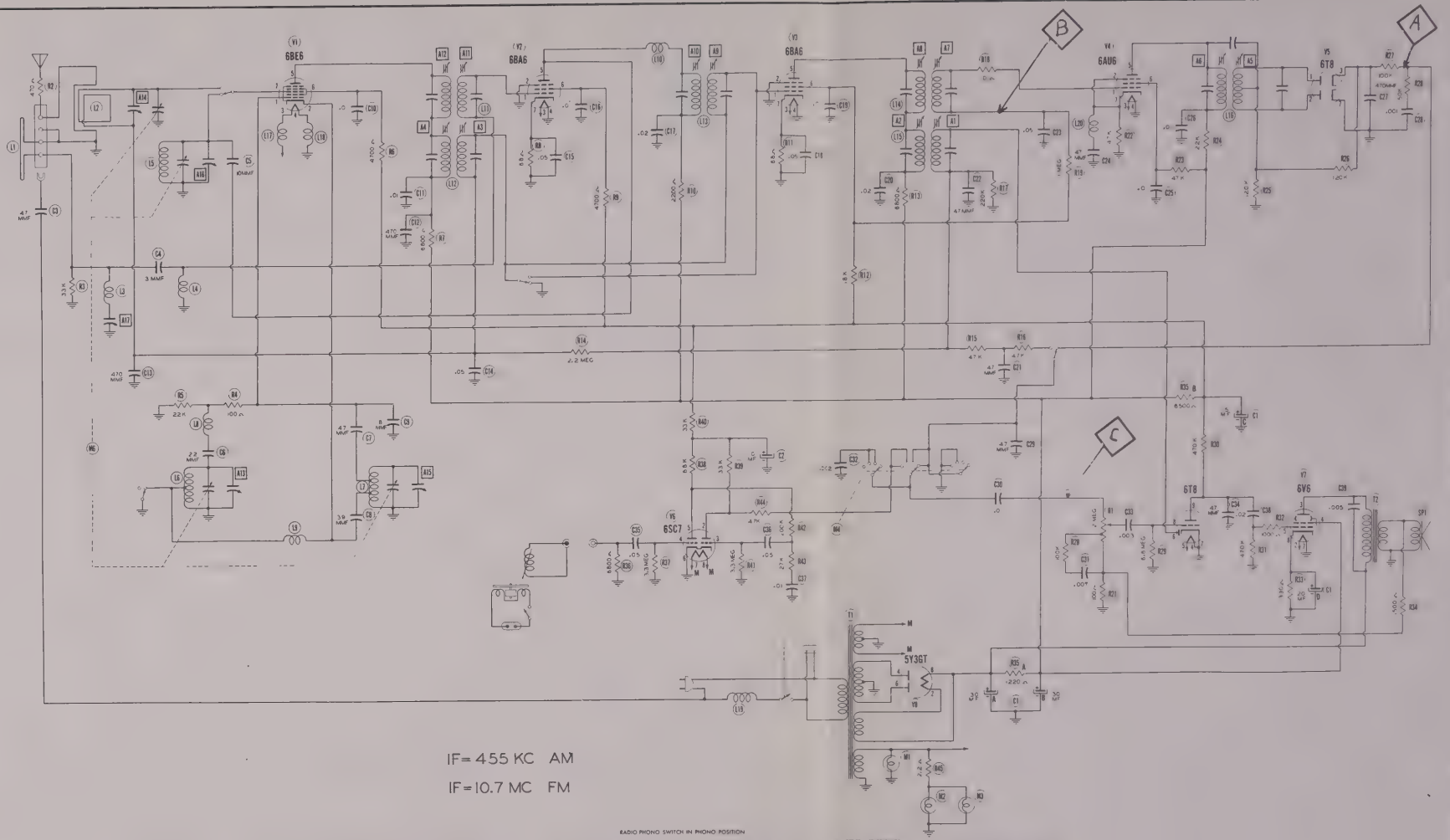

RADIO PHONO SWITCH IN PHONO POSITION

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BE6	5-6.4VDC	0	6.4VAC	0V	215VDC	65VDC	2.7VDC		
4 V 2	6BA6	0V	0V	6.4VAC	0V	210VDC	1.9VDC	65VDC		
V 3	6BA6	2.8VDC	0V	6.4VAC	0V	140VDC	0.4VDC	0.4VDC		
4 V 4	6AU6	75VDC	215VDC	1.1VAC	0V	195VDC	0.25VDC	0VDC		
6 V5	6T8	0.8VDC	0.8VDC	0.1VDC	0V	0.6VAC	0.2VDC	0	0.7VDC	0.6VDC
V6	6SC7	0.2VDC	13 DC	0.2VDC	0V	0.4VAC	1.0VDC	0V	0.7VDC	1.0VDC
1 V7	6V6	0V	75VDC	0.4VDC	0.8VDC	0.8VAC	0V	5.4VAC	5.2VAC	
V8	5Y3GT	0V	0V	265VDC	265VDC	0V	0	6.4VAC	0.2VDC	
V9	6V6-T	0V	0V	265VDC	265VDC	0V	0	6.4VAC	0.2VDC	
V10	5Y3GT	0V	270VDC	0V		260VAC	0V	260VAC	0V	270VDC

TAKEN WITH VACUUM TUBE VOLTMETER

‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BE6	330Ω	0	0	0	0	4700Ω	100Ω	0	
4 V 2	6BA6	0	0	0	0	0	4700Ω	100Ω	0	
V 3	6BA6	330Ω	0	0	0	0	4700Ω	100Ω	0	
4 V 4	6AU6	270Ω	0	0	0	0	6800Ω	100Ω	0	
6 V5	6T8	0	0	0	0	0	0	0	0	0
V6	6SC7	0	0	0	0	0	0	0	0	0
1 V7	6V6	0	0	0	0	0	0	0	0	0
V8	5Y3GT	0	0	0	0	0	0	0	0	0
V9	6V6-T	0	0	0	0	0	0	0	0	0
V10	5Y3GT	0	0	0	0	0	0	0	0	0

*Measured from pin 8 of V8

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

AM IF ALIGNMENT USING METER.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 7 (Grid) 6BE6 (V1). Low side to chassis.	455KC (400~ Mod)	AM (clock-wise)	550KC	Across voice coil	A1,A2 A3,A4	Adjust for maximum output.

FM IF ALIGNMENT USING METER

When connecting the signal generator to the grid (Pin 7 of V1) of the 6BE6 converter tube in step 7 first disconnect the copper strap connected to that pin and substitute a 100KΩ resistor for a grid load.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
2.	.01MFD	High side to pin 1 (Grid) 6BA6 (V3). Low side to chassis.	10.7MC (400~ Mod.)	FM (counter clock-wise.)	Point of non interference	Across voice coil 20000 Ω/V METER	A5	Adjust for minimum output. Three minimums may be obtained. The center one is the correct setting. The meter reading should increase on either side of the correct setting.
3.	.01MFD	"	Slightly detune from 10.7MC to smaller of two peaks obtained on either side of minimum obtained in step 2.	"	"	One lead to point (A) Other lead to chassis.	A6	The smaller peak at which the generator is set may be positive or negative. Connect the 20,000Ω/v meter accordingly. Adjust A6 for maximum deflection.
4.	Repeat	step 2.						
5.	.01MFD	"	10.7MC (No Mod.)	"	"	One lead to point (B) Other lead to pin 7 (cathode) 6AU6 (V4) thru 200KΩ	A7,A8	Attenuate signal generator to give 1 volt reading. Adjust A7 & A8 for maximum deflection.
6.	.01MFD	High side to pin 1 (Grid) 6BA6 (V2). Low side to chassis.	"	"	"	"	A9, A10	Attenuate signal generator to give 1 volt reading. Adjust A9 & A10 for maximum deflection.
7.	.01MFD	High side to pin 7 (Grid) 6BE6 (V1). Low side to chassis.(See alignment instructions.)	"	"	"	"	A11, A12	Attenuate signal generator to give 1 volt reading. Adjust A11,A12 for maximum deflection. Remove 100KΩ substitute grid lead and reconnect copper strap.

AM RF ALIGNMENT USING METER

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
8.		Loop	1620KC (400~ Mod.)	AM	Tuning cap fully open	Across voice coil	A13	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust of maximum output.
9.		Loop	1500KC (400~ Mod.)	"	Tune for maximum signal.	"	A14	Rock tuning cap and adjust for maximum output. Set the pointer to 1500KC or the 161 mark on the scale on the reverse side of the dial backplate.

FM RF ALIGNMENT USING METER

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	20000 Ω/V METER	ADJUST	REMARKS
10.	300Ω carbon res.	Across FM Ant. terminals.	108MC (No Mod.)	FM	Tuning cap fully open	One lead to point (B) Other lead thru 200KΩ to pin 7 of V4.	A15	Adjust for maximum deflection.
11.	"	"	"	"	Tune for maximum output.	"	A16	Rock tuning cap and adjust for maximum deflection.
12.	"	"	10.7MC	"	Point of non-interference	"	A17	Adjust for minimum deflection.

AM IF ALIGNMENT USING OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 20KC sweep. Connect synchronizing sweep voltage from signal generator to horizontal amplifier of the oscilloscope.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
1.	.01MFD	High side to pin 7 (Grid) 6BE6 (V1). Low side to chassis.	455KC (20KC Sweep)	AM	Point of non-interference	Vert.Amp. to Point ◇ Low side to chassis.	A1,A2, A3,A4	Adjust for maximum amplitude and symmetry as per Fig. 1.

FM IF ALIGNMENT USING OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
2.	.01MFD	High side to pin 1 (Grid) 6BA6 (V3). Low side to chassis.	10.7MC (450KC Sweep)	FM	Point of non-interference	Vert.Amp. thru 200KΩ to pin 7 of V4. Low side to chassis.	A7,A8	Connect 8MFD oil filled cap. from point B to chassis. Adjust A7 and A8 for maximum amplitude and symmetry as per Fig. 2.
3.	.01MFD	High side to pin 1 (Grid) 6BA6 (V2). Low side to chassis.	"	"	"	"	A9, A10	Adjust A9 & A10 for maximum amplitude and symmetry as per Fig 2.
4.	.01MFD	High side to pin 7 (Grid) 6BE6 (V1). Low side to chassis. (Remove copper strap and substitute100KΩ resistor for grid load for V1).	"	"	"	"	A11, A12	Adjust A11 and A12 for maximum amplitude and symmetry as per Fig 2. Remove oil filled capacitor after adjusting A11 and A12.
5	.01MFD	"	"	"	"	"	A5,A6	Adjust A6 for maximum amplitude and symmetry as per Fig. 3. Adjust A5 so crossover occurs at center of pattern. Retouch A6 for maximum amplitude andstraightness of crossover lines. Remove 100KΩ substitute grid load for V1 and reconnect copper strap.

AM RF ALIGNMENT USING OSCILLOSCOPE

In step 6 feed 60∿ signal to modulate the 1620KC RF Signal and also feed to horizontal amplifier of scope. This usually is accessible on front panel of the oscilloscope.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	SCOPE CONNECT	ADJUST	REMARKS
6.		Loop	1620KC (60∿ Amp. Mod.)	AM	Tuning cap fully open	Vert.Amp. to point ◇ Low side to chassis.	A13	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust A13 for steepest slope of straight line trace as per Fig. 4.
7.		Loop	1500KC (20KC Sweep)	"	Tune for maximum output	"	A14	Adjust for maximum amplitude as per Fig. 1. Set pointer to 1500KC or 161 mark on scale on reverse side of dial backplate.

FM RF ALIGNMENT USING OSCILLOSCOPE

In step 8 feed 60∿ signal to modulate 108MC signal and feed same 60∿ signal to horizontal amplifier of scope.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
8.	300Ω carbon res.	Across FM Ant. terminals.	108MC (60∿ Amp. Mod.)	FM	Tuning cap fully open	Vert.Amp. thru 200KΩ to pin 7 of V4. Low side to chassis.	A15	Connect 8MFD oil filled cap. from point B. to chassis. Adjust A15 for steepest slope of straight line trace as per Fig. 4.
9.	"	"	98MC (450KC Sweep)	"	Tune for maximum output.	"	A16	Adjust for maximum amplitude and symmetry as per Fig. 2. Remove 8MFD Cap.
10	"	"	10.7MC (400∿ Mod.)	"	Point of non-interference		A17	Adjust for minimum audio output in speaker.

FIG. 1

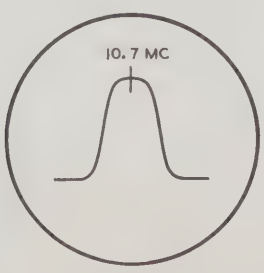

FIG. 2

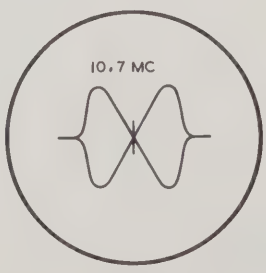

FIG. 3

FIG. 4

MOTOROLA
MODELS 58G11, 58G12

MOTOROLA
MODELS 58G11, 58G12

MOTOROLA MODEL 58G11

TRADE NAME	Motorola, Models 58G11, 58G12 (Ch. HS-160)
MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago 51, Illinois.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna.
TUBES (FIVE)	Types 12BE6 Converter, 12BA6 IF Amp., 12AT6 DET-AVC-AF, 50C5 Power Output, 35W4 Rectifier.
POWER SUPPLY	105-125 Volts AC RATING .24 Amp. @ 117VAC
TUNING RANGE—BROADCAST	535-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not, connect a .1 MFD cap. in series with low side of signal generator and chassis.

To set pointer turn tuning cap. fully closed and set pointer parallel with base of dial.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1MFD	High side to rear stator of tuning gang. Low side to chassis.	455KC	Tuning gang fully open.	Across Voice Coil.	A1, A2 A3, A4	Adjust for maximum output. If isolation transformer is not used reduce dummy antenna to .001 MFD to reduce hum modulation.
2	.1MFD	"	1620KC	"	"	A5	Adjust for maximum output.
3		Loop	1400KC	Tune for max. signal.	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

MOTOROLA
MODEL 58G11

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	DET-AVC-AF Amp.	12AT6	12AT6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	50	150	23K482857	PRSA150/50	EDL5315		DSB-5030	TA-530	Filter Red
B	30	150		-30			-150		Filter Green
C2	.05	200	8S9821	P288-05	GT2S5		ST-4-05	TM-15	AVC Filter
C3A	220		21B482847	1468-0002	5W5T2	GP2K-200	MO.5-32	1FM-32	Diode Filter
B	2000			P688-002	GT6D2	GP2M-002	ST-6-002	TM-22	Audio Coupling
C	220			1468-0002	5W5T2	GP2K-200	MO.5-32	1FM-32	AF Plate Bypass
D	5000			P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Audio Coupling
C4	.02	400	8S9802	P488-02	GT4S2		ST-4-02	TM-12	Output Plate Bypass
C5	.05	400	8S9816	P488-05	GT4S5		ST-4-05	TM-15	Line Filter

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg	½	18A70032	D13-137	AM-63-Z	Volume Control
B	Shaft			E	KSS-3	Attach to R1A per instr.
C	Switch			41	SW-A	Attach to R1A per instr.

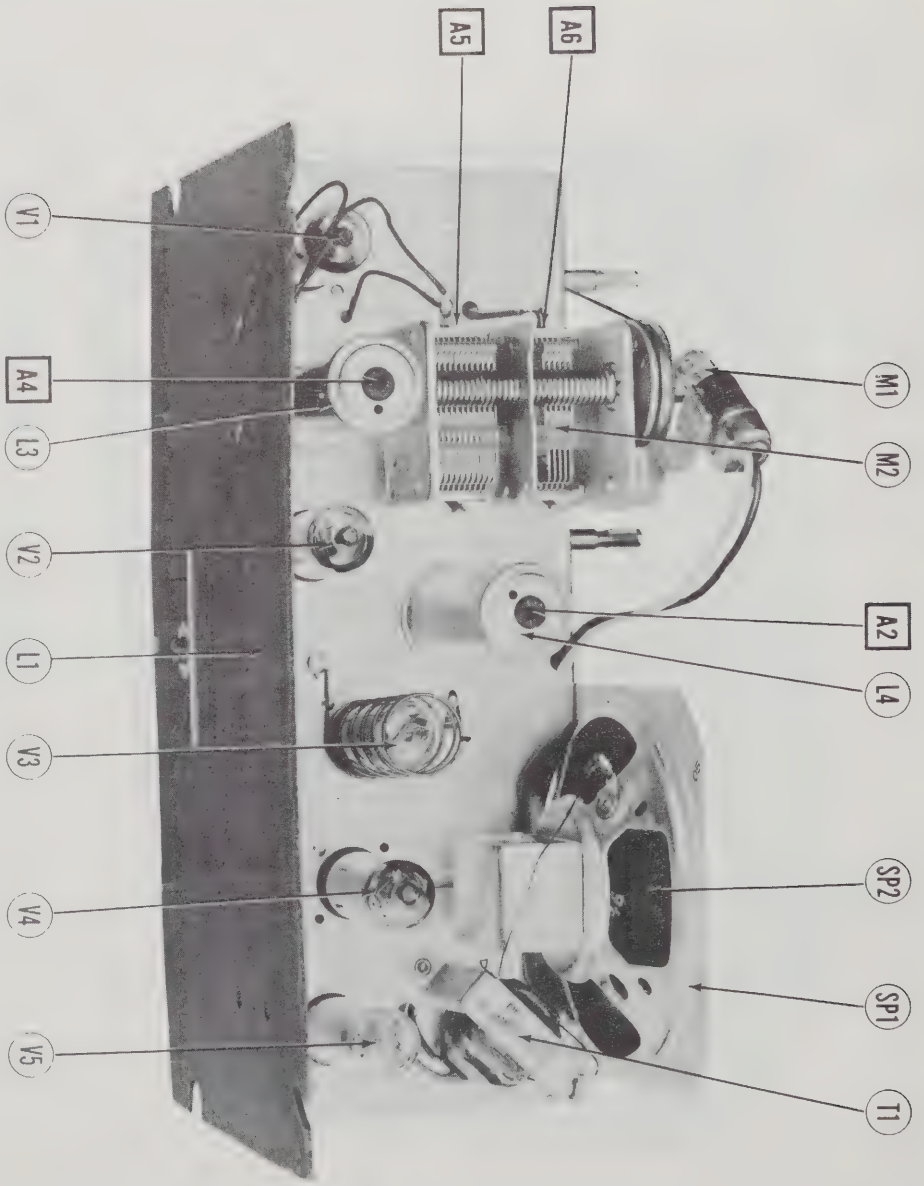
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	IDENTIFICATION CODES
R2	22KΩ	½	6R6028	BTS-22K	Osc. Grid
R3	100Ω	½	6R6018	BW-½-100	IF Cathode
R4	3.3 Meg	½	6R2118	BTS-3.3 Meg	AVC Network
R5	10 Meg	½	6R2109	BTS-10 Meg	1ST AF Grid
R6	470KΩ	½	6R6032	BTS-470K	1ST AF Plate
R7	470KΩ	½	6R6032	BTS-470K	Output Grid
R8	150Ω	½	6R3992	BW-½-150	Output Cathode
R9	1000Ω	1	6R3953	BTA-1000	Filter
R10	27Ω	½	6R5683		Surge Limiter

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: MOTOROLA PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	INSTALLATION NOTES
T1	2300Ω	3.2Ω	178Ω	.4Ω	25K485973	A-3876†	RO-21	A-3025	†Drill One New Mtg. Hole

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: MOTOROLA PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	V.C. IMP.				
SP1	PM	3.2Ω	30C478138	ST-113 MOD.P4-X	4A07	
	CONE DIA.	V.C. DIA.				
SP1	3-7/8"	5/16"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: MOTOROLA PART No.	MEISSNER PART No.
L1	Loop Ant.	3.5Ω		24C485970	
L2	AM Osc.Coil	12Ω		24K482855	14-1060
L3	Input IF	12Ω	12Ω	24B482863	16-6678
L4	Output IF	12Ω	12Ω	24B482865	16-6678

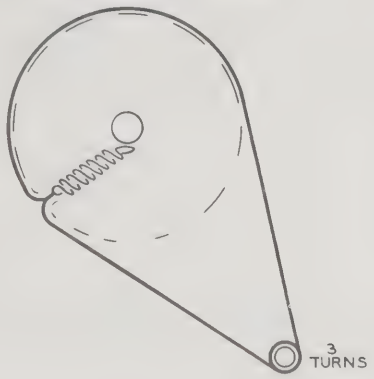
DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: MOTOROLA PART No.		NOTES
M1	Bayonet	6-8	.15	Brown	65X11854		Type #47

MISCELLANEOUS

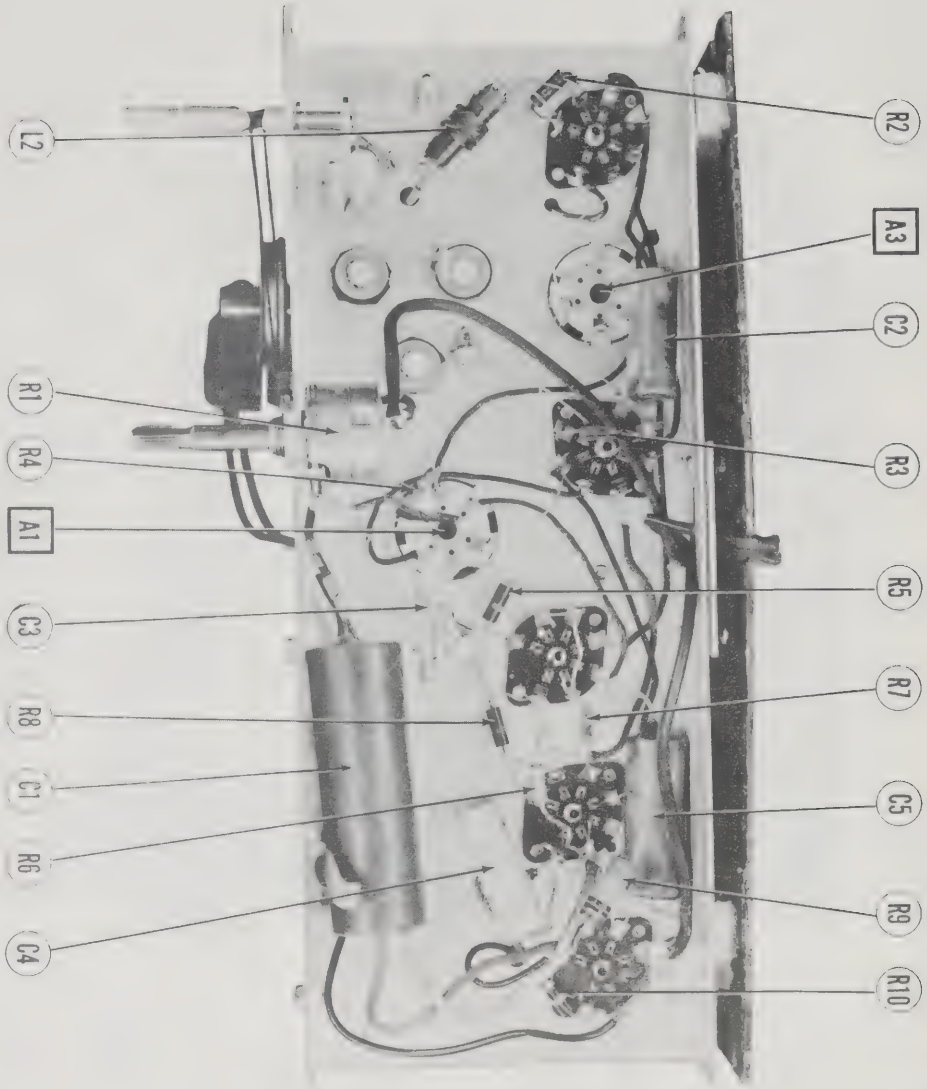
ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M2	2 Gang. Var. Cap.	1X485960	(23-385MMF, 16-105MMF)
	Dial Pointer	52B485985	
	Cabinet	10E485975	58G11
	Cabinet	16K485977	58G12
	Knob	36A485968	58G11
	Knob	36K485969	58G12

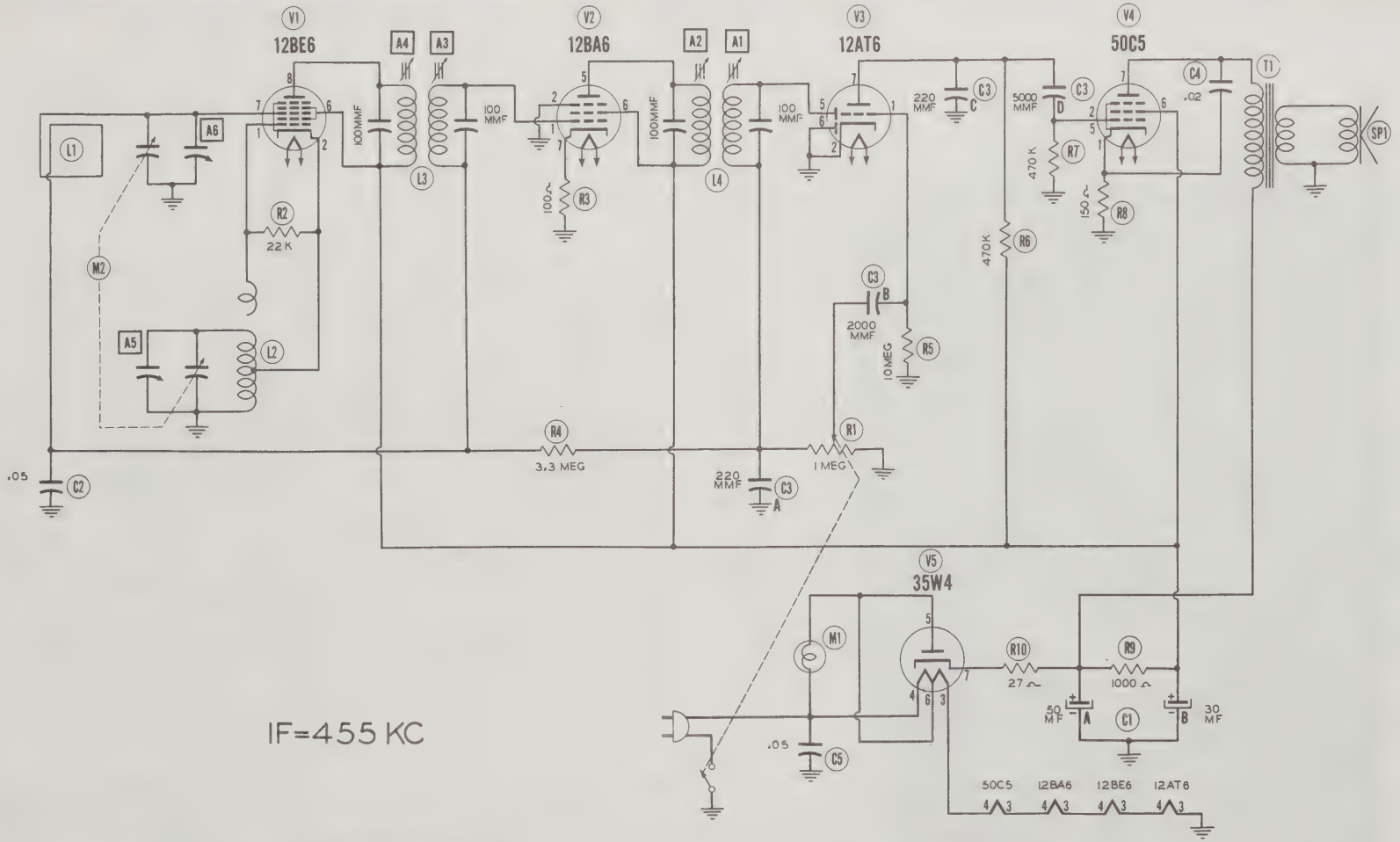
TUNING GANG FULLY CLOSED



DIAL CORD DRIVE

CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	§-7VDC	0V	12VAC	25VAC	90VDC	90VDC	0V
V 2	12BA6	0V	0V	25VAC	37VAC	90VDC	90VDC	1.1VDC
V 3	12AT6	-.4VDC	0V	0V	12VAC	-.4VDC	0V	45VDC
V 4	50C5	5VDC	0V	37VAC	85VAC	0V	90VDC	110VDC
V 5	35W4	115VDC	0V	85VAC	117VAC	110VAC	110VAC	117VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	0Ω	13Ω	24Ω	*1000Ω	*1000Ω	4Meg.
V 2	12BA6	4Meg.	0Ω	24Ω	36Ω	*1000Ω	*1000Ω	100Ω
V 3	12AT6	10Meg.	0Ω	0Ω	13Ω	1Meg.	0Ω	*470KΩ
V 4	50C5	150Ω	470KΩ	36Ω	85Ω	470KΩ	*1000Ω	*200Ω
V 5	35W4	50KΩ	0Ω	85Ω	115Ω	110Ω	110Ω	50KΩ

* Measured from pin 7 of V5

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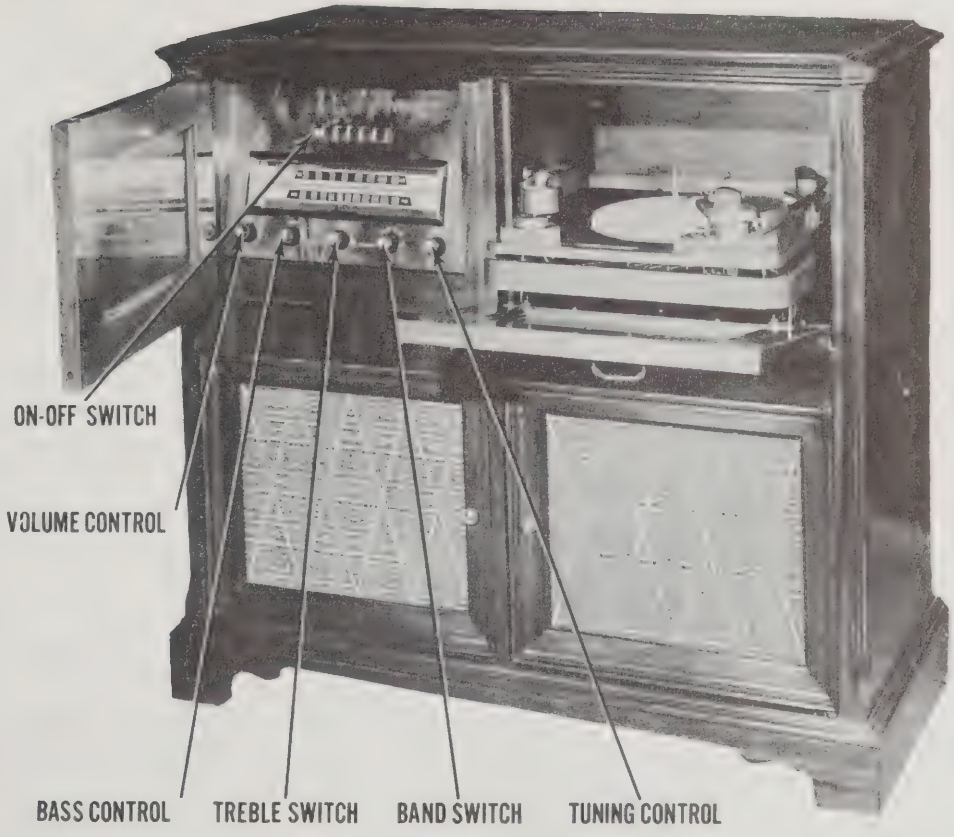
4912-8

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

PHILCO
MODEL 49-1615



PHILCO
MODEL 49-1615

PHILCO MODEL 49-1615

TRADE NAME	Philco, Model 49-1615
MANUFACTURER	Philco Corp., Tioga & "C" Sts., Philadelphia, Pa.
TYPE SET	AC Operated Combination Phono-Radio, AM-FM Superheterodyne Receiver with Loop Antenna.
TUBES(ELEVEN)	Types 6AU6 FM RF Amp., 7F8 Converter, 6BJ6 or 6BA6 1st IF Amp., 6BJ6 or 6BA6 2nd IF Amp., 6T8 DET-AVC-AF, 7F7 Scratch Amp., 7E7 Rectifier-Reactance Control, 7A4 Phase Inverter, (2) 6V6GT Power Output, 5U4G Rectifier
POWER SUPPLY	105-125 Volts AC — RATING 1.07 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1620KC — FREQ. MOD. 88-108MC

PUSHBUTTON ADJUSTMENT

1. Make up a list of stations desired to be set up, making sure that each station falls within the freq. range of its button. These ranges, from right to left viewed from rear of chassis, are: 540-1000KC, 600-1200KC, 650-1300KC, 850-1500KC and 900-1600KC.
2. Turn receiver on and allow it to warm up for at least fifteen minutes.
3. Tune in lowest freq. station with manual tuning control and turn band switch to push button position.
4. Adjust B1 to tune in desired station and B2 for maximum volume.
5. Return band switch to BC position and check for correct station.
6. To set up the remaining buttons repeat the procedure outlined in steps 3 thru 5 above.

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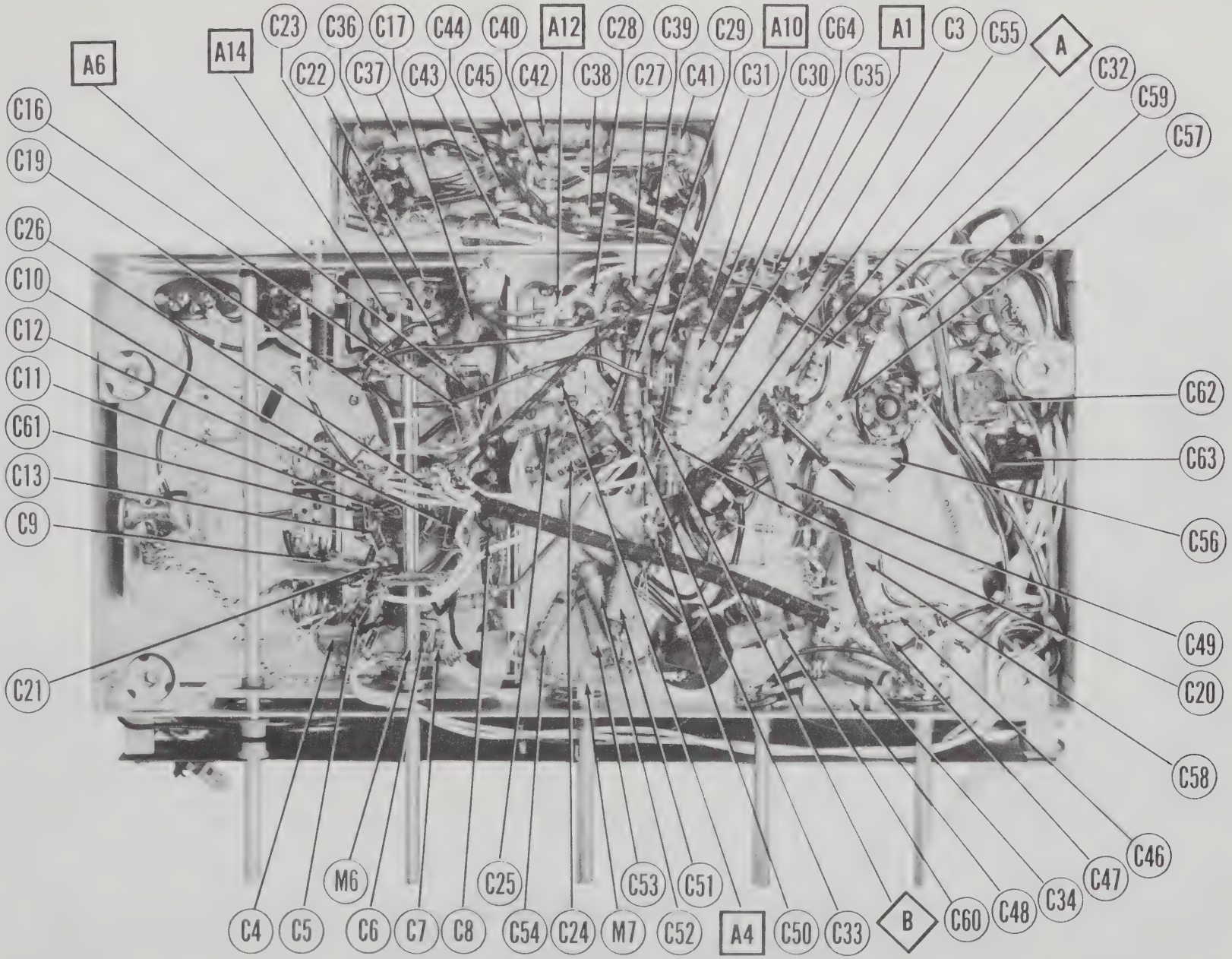
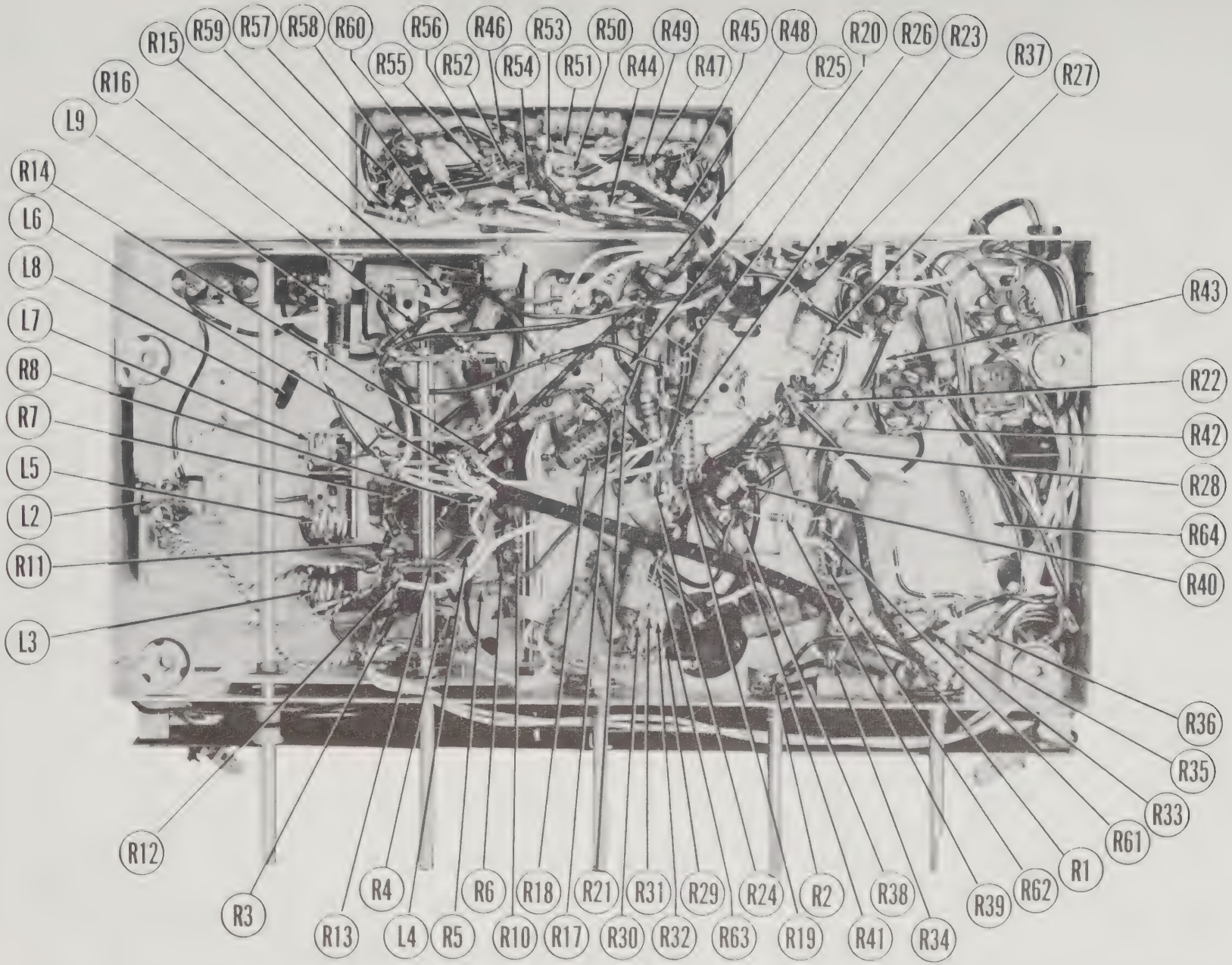
DATE 6/49 4912-9 SET #64 FOLDER 9


A6
A14
C23
C36
C17
C44
C40
A12
C28
C39
C29
A10
C64
A1
C3
C55
A
C22
C37
C43
C45
C42
C38
C27
C41
C31
C30
C35
C32
C59
C57
C16
C19
C26
C10
C12
C11
C61
C13
C9
C62
C63
C56
C49
C20
C58
C21
C46
C47
C34
C48
C60
B
C50
C33
A4
C52
C51
C53
M7
C24
C54
C25
M6
C8
C7
C6
C5
C4


R15
R59
R57
R58
R60
R56
R46
R53
R50
R49
R45
R48
R20
R26
R23
R37
R27
R16
R55
R52
R54
R51
R44
R47
R25
L9
R14
L6
L8
L7
R8
R7
L5
L2
R11
L3
R43
R22
R42
R28
R64
R40
R36
R35
R33
R61
R1
R62
R39
R38
R2
R24
R29
R31
R21
R18
R6
R4
R12
R3
R13
L4
R5
R10
R17
R30
R32
R63
R19
R41
R34

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	FM RF Amp.	6AU6	6AU6	7BK	
V2	Converter	7F8	7F8	8BW	
V3A	1st IF Amp.	6BJ6	6BJ6	7CM	
B	1st IF Amp.	6BA6	6BA6	7BK	
V4A	2nd IF Amp.	6BJ6	6BJ6	7CM	
B	2nd IF Amp.	6BA6	6BA6	7BK	
V5	DET-AVC-AF Amp	6T8	6T8		
V6	Scratch Amp.	7E7	7E7	8AC	
V7	Rect.-React Control	7E7	7E7	8AE	
V8	Phase Inverter	7A4	7A4	5AC	
V9	Power Output	6V6GT	6V6GT	7AC	
V10	Power Output	6V6GT	6V6GT	7AC	
V11	Rectifier	5U4G	5U4G	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	20	475	30-2556		CT2250		DY-4x10-450*	EL-410*	▲Filter
B	10	475							▲Filter
C2	40	475	30-2568-20		UP2250*		DY-4x10-450*	TVL-8	Filter
C3	2	500	30-2417-7		BR415		K-4-1400	TWA-12	Stabilizing Cap
C4	33	500	30-1224	1468-00004	5W5Q3	NP0L-33	MO.5-43	1FM-44	RF Coupling
C5	100		62-11000 9001	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Fil. Bypass
C6	100		62-11000 9001	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Cath. Bypass
C7	100		62-11000 9001	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Screen Bypass
C8	1500		62-21500 1011	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	RF Plate Decoupling
C9	33	500	30-1224	1468-00004	5W5Q3	NP0L-33	MO.5-43	1FM-44	RF Coupling
C10	220		62-12200 1001	1468-0002	5W5T2	GP2K-200	MO.5-32	1FM-32	Osc. Feedback
C11	100		62-11000 9001	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Osc. Grid Cap
C12	750	500	30-10755 501	1468-00075	1W5T7	GP2K-750	MO.5-37	1FM-27	Osc. Coupling
C13	220		62-12200 1001	1468-0002	5W5T2	GP2K-200	MO.5-32	1FM-32	RF Coupling
C14	220								Feedback ±1%
C15	1000								Feedback ±1%
C16	.01	400	61-0120	P488-01	GT4S1	GP2-S35-01	ST-4-01	TM-11	Conv. Plate Decoup.
C17	.01	400	61-0120	P488-01	GT4S1	GP2-S35-01	ST-4-01	TM-11	Conv. Plate Decoup.
C18	3		30-1021						Fixed Trimmer Note 5
C19	.01	400	61-0120	P488-01	GT4S1	GP2-S35-01	ST-4-01	TM-11	AVC Filter
C20	.01	400	30-4041	P488-01	GT4S1	GP2-S35-01	ST-4-01	TM-11	AVC Filter Special
C21	100		62-11000 9001	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Bypass
C22	100		62-11000 9001	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	1st IF Fil. Bypass
C23	.003	600	61-0120	P488-003	GT6S3	GP1K-003	ST-4-003	TM-23	1st IF Screen " Note 1
C24	.01	400	61-0120	P488-01	GT4S1	GP2-S35-01	ST-4-01	TM-11	1st IF Plate Decoup.
C25	.01	400	30-4041	P488-01	GT4S1	GP2-S35-01	ST-4-01	TM-11	RF Bypass Special
C26	1500		62-21500 1011	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	RF Bypass
C27	100		62-11000 9001	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	2nd IF Fil. Bypass
C28	.05	200	61-0120	P288-05	GT2S5		ST-4-05	TM-15	2nd IF Cath. " Note 4

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R3	1 Meg	½	66-5103340	BTS-1 Meg	FM RF Grid
R4	82Ω	½	66-0823340	BW-½-82	FM RF Cathode
R5	56KΩ	1	66-3563340	BTA-56K	FM RF Screen
R6	1000Ω	½	66-2103340	BTS-1000	FM RF Plate Decoupling
R7	15KΩ	½	66-3153340	BTS-15K	Osc. Grid
R8	2200Ω	½	66-2223340	BTS-2200	Converter Cathode See Note 1
R9	1000Ω	½	66-2103340	BTS-1000	Osc. Cathode See Note 2
R10	47KΩ	½	66-3473340	BTS-47K	Decoupling
R11	2.2 Meg	½	66-5223340	BTS-2.2 Meg	AVC Network
R12	470KΩ	½	66-4473340	BTS-470K	AVC Network
R13	2.2 Meg	½	66-5223340	BTS-2.2 Meg	AVC Network
R14	27KΩ	½	66-3273340	BTS-27K	Decoupling
R15	390Ω	½	66-1393340	BW-½-390	1st IF Cathode
R16	82Ω	½	66-0823340	BW-½-82	1st IF Cathode
R17	33KΩ	½	66-3333340	BTS-33K	1st IF Screen
R18	1000Ω	½	66-2103340	BTS-1000	1st IF Plate Decoupling
R19	3.3 Meg	½	66-5333340	BTS-3.3 Meg	AVC Network
R20	82Ω	½		BW-½-82	2nd IF Cathode See Note 7
R21	33KΩ	½	66-3333340	BTS-33K	2nd IF Screen See Note 3
R22	1000Ω	½	66-2103340	BTS-1000	2nd IF Plate Decoupling
R23	47KΩ	½	66-3473340	BTS-47K	Diode Filter
R24	330KΩ	½	66-4333340	BTS-330K	Diode Load
R25	6.8 Meg	½	66-5683340	BTS-6.8 Meg	FM Det. Load
R26	100KΩ	½	66-4103340	BTS-100K	De-emphasis
R27	47KΩ	½	66-3473340	BTS-47K	FM Diode Load
R28	10 Meg	½	66-6103340	BTS-10 Meg	1st AF Grid
R29	220KΩ	½	66-4223340	BTS-220K	1st AF Plate
R30	4.7 Meg	½	66-5473340	BTS-4.7 Meg	Tone Compensation
R31	4.7 Meg	½	66-5473340	BTS-4.7 Meg	Tone Compensation
R32	4.7 Meg	½	66-5473340	BTS-4.7 Meg	Tone Compensation
R33	220KΩ	½	66-4223340	BTS-220K	Tone Compensation
R34	68KΩ	½	66-3683340	BTS-68K	Tone Compensation
R35	4.7Ω	½	66-9473340	BW-½-4.7	Feed Back Voltage Divider
R36	120Ω	½	66-1123340	BW-½-120	Feed Back Voltage Divider
R37	100KΩ	½	66-4103340	BTS-100K	Series Test Jack
R38	1 Meg	½	66-5103340	BTS-1 Meg	Phase Inv. Grid
R39	47KΩ	½	66-3473340	BTS-47K	Phase Inv. Cathode
R40	4700Ω	½	66-2473340	BTS-4700	Phase Inv. Cathode
R41	56KΩ	½	66-3563340	BTS-56K	Phase Inv. Plate
R42	330KΩ	½	66-4333340	BTS-330K	Output Grid
R43	330KΩ	½	66-4333340	BTS-330K	Output Grid
R44	1 Meg	½	66-5103340	BTS-1 Meg	Scratch Amp. Grid
R45	2200Ω	½	66-2223340	BTS-2200	Scratch Amp. Cathode
R46	100KΩ	½	66-4103340	BTS-100K	Phono Shunt
R47	560KΩ	½	66-4563340	BTS-560K	Scratch Amp. Grid
R48	220KΩ	½	66-4223340	BTS-220K	Scratch Amp. Plate
R49	33KΩ	½	66-3333340	BTS-33K	Scratch Amp. Plate See Note 4
R50	220KΩ	½	66-4223340	BTS-220K	Bias Network
R51	120KΩ	½	66-4123340	BTS-120K	Bias Network
R52	560KΩ	½	66-4563340	BTS-560K	Bias Network
R53	1.5 Meg	½	66-5153340	BTS-1.5 Meg	Bias Network
R54	3.3 Meg	½	66-5333340	BTS-3.3 Meg	Bias Network
R55	220KΩ	½	66-4223340	BTS-220K	Scratch Rect. Diode Load
R56	680KΩ	½	66-4683340	BTS-680K	Scratch Rect. Diode Load
R57	1 Meg	½	66-5103340	BTS-1 Meg	Reactance Tube Grid
R58	33KΩ	1	66-3333340	BTA-33K	Reactance Tube Screen
R59	33KΩ	1	66-3333340	BTA-33K	Reactance Tube Screen Bleeder
R60	56KΩ	1	66-3563340	BTA-56K	Reactance Tube Plate See Note 5
R61	330KΩ	½	66-4333340	BTS-330K	Output Grid
R62	1.2 Meg	½	66-5123340	BTS-1.2 Meg	Bias Network
R63	10K	5		BT-5-10K	Filter See Note 6
R64	18KΩ	9	33-1335-85	AB-18K	Bleeder

NOTE 1 Some Models Use 1500Ω Resistor In This Application. IRC Replacement BTS-1500
NOTE 2 Some Models Use 6800Ω Resistor In This Application. IRC Replacement BTS-6800
NOTE 3 Some Models Use 22KΩ Resistor In This Application. IRC Replacement BTS-22K
NOTE 4 Some Models Use 100KΩ Resistor In This Application. IRC Replacement BTS-100K
NOTE 5 Some Models Use 47KΩ Resistor In This Application. IRC Replacement BTS-47K
NOTE 6 Some Models Use 18KΩ Resistor In This Application. IRC Replacement AB-18K
NOTE 7 Some Models Use 330Ω Resistor In This Application. IRC Replacement BW-½-330

PARTS LIST AND DESCRIPTIONS (Continued)

ITEM No.	RATING CAP.	RATING VOLT	PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C29	.003	600	61-0120	P688-003	GT6D3	GP2M-003	ST-6-003	TM-23	2nd IF Screen " Note 1
C30	.04	400	45-3500-2	P488-04	GT6S4		ST-6-04	TM-14	De-emphasis
C31	.068	400	45-4119	P488-075		RE-633 -0075		68P7	De-emphasis
C32	100		62-11000 9001	1468-0001	SW5T1	GP1K-100	MO.5-31	1FM-31	Det. & AF Fil. Bypass
C33	100		62-11000 9001	1468-0001	SW5T1	GP1K-100	MO.5-31	1FM-31	RF Bypass
C34	.006	400	45-3500-7	P488-006	GT6D6	RE-633 -007	ST-6-006	TM-26	Audio Coupling
C35	100		62-11000 9001	1468-0001	SW5T1	GP1K-100	MO.5-31	1FM-31	RF Bypass
C36	.001	600	45-3500-4	P688-001	GT6D1	GP2L-001	ST-6-001	TM-21	Audio Coupling
C37	100	500	60-11184-7	1468-0004	SW5T5	GP2K-100	MO.5-32	1FM-32	Feedback Note 4
C38	100	500	60-11184-7	1468-00015	SW5T15	GP2K-150	MO.5-315	1FM-315	Audio Coupling
C39	300	500	60-10084-7	1468-00035	SW5T5	GP2K-300	MO.5-33	1FM-33	Audio Coupling
C40	.002	400	61-0004	P688-002	GT6D2	GP2M-002	ST-6-002	TM-22	Audio Coupling
C41	.01	400	61-0120	P488-01	GT4S1	GP2-633-01	ST-4-01	TM-11	Bias Filter
C42	.02	400	61-0130	P488-02	GT4S2		ST-4-02	TM-12	Bias Filter
C43	.03	400	45-3500-1	P488-03	GT4S3		ST-6-03	TM-13	Bias Filter
C44	.01	400	61-0120	P488-01	GT4S1	GP2-633-01	ST-4-01	TM-11	Bias Filter
C45	.03	400	45-3500-1	P488-03	GT4S3		ST-4-03	TM-13	Bias Filter
C46	100		62-11000 9001	1468-0001	SW5T1	GP1K-100	MO.5-31	1FM-31	Tone Comp.
C47	100		62-11000 9001	1468-0001	SW5T1	GP1K-100	MO.5-31	1FM-31	Tone Comp.
C48	.006	400	45-3500-7	P488-006	GT6D6		ST-6-006	TM-26	Tone Comp. Note 5
C49	.006	400	45-3500-7	P488-006	GT6D6	GP2-633 -0075	ST-6-006	TM-26	Audio Coupling
C50	100		62-11000 9001	1468-0001	SW5T1	GP1K-100	MO.5-31	1FM-31	AF Plate Bypass
C51	.006	400	45-3500-7	P488-006	GT6D6		ST-6-006	TM-26	Tone Comp.
C52	.003	600	61-0117	P688-003	GT6D3	GP2M-003	ST-6-003	TM-23	Tone Comp.
C53	.001	600	45-3500-5	P688-001	GT6D1	GP2L-001	ST-6-001	TM-21	Tone Comp.
C54	.0015	400	45-3500-8	P688-0015		GP2L-0015			Tone Comp.
C55	470	500	60-10184-7	1468-0005	SW5T5	GP2K-500	MO.5-35	1FM-35	Audio Coupling
C56	.006	400	45-3500-7	P488-006	GT6D6	GP2-633 -007	ST-6-006	TM-26	Audio Coupling
C57	.006	400	45-3500-7	P488-006	GT6D6	GP2-633 - 07	ST-6-006	TM-26	Audio Coupling
C58	.5	200	45-3500-10	P288-5	GT5P5		ST-2-5	68P25	Bias Filter
C59	.003	1000	61-0117	P1688-003	GT6D3		STM-16 -003	MB-23	Output Plate Bypass
C60	.01	400	61-0120	P488-01	GT4S1	GP2-633-01	ST-4-01	TM-11	RF Bypass
C61	100		62-11000 9001	1468-0001	SW5T1	GP1K-100	MO.5-31	1FM-31	Conv. Fil. Bypass
C62	.01		60-0120	P688-01	GT6S1	GP2-633-01	MPH-6-01	TM-11	Line Filter
C63	.01		60-0120	P688-01	GT6S1	GP2-633-01	MPH-6-01	TM-11	Line Filter
C64	.01	400	45-4441	P488-01	GT4S1		ST-4-01	TM-11	2nd IF Plate Decoup.

*Parallel Sections To Obtain Desired Capacity.
NOTE 1. Some Models Use .01MFD In This Application.
NOTE 2. Some Models Use 100MMF In This Application.
NOTE 3. Some Models Use .003MMF In This Application.
NOTE 4. Some Models Use .01MFD In This Application.
NOTE 5. Not Used In All Models.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	2 Meg	½	45-3012	D18-139X	T-116	Volume control tapped @ 1 Meg
B	Shaft		Not Req.	A	Not Req.	Attach to R1A per instr.
R2A	1 Meg	½	45-3012			Tone control
B	Shaft		Not Req.			Attach to R2A per instr.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	PHILCO PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1	117VAC @ 1.07A	710VAC CT @ .18A DC	5VAC @ 3A	6.3VAC @ 4.4A	32-4079	P-8411 †	TV-110 †	P-8151 †

† Drill new mounting holes.

TRANSFORMER (OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	PHILCO PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	INSTALLATION NOTES
T2	7600Ω CT	1.3Ω	300Ω CT	.4Ω	32-4079	A-8411	R-110	A-2904	

SPEAKER

ITEM No.	RATINGS		PHILCO PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	V.C. IMP.				
SP1	700Ω	10.8Ω	32-8379		12E60#	#Add 100Ω resistor in series with Field and replace output transformer to match 6-8Ω voice coil.
	CONE DIA.	V.C. DIA.				
SP2	11-3/4"	1-3/4"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	PHILCO PART No.	MEISSNER PART No.	
L1	AM Loop Ant	0Ω		76-4337-1		
L2	Loop Load-ing Coil	1.8Ω		32-4049-3		
L3	FM Ant Coil	0Ω		32-4158-1		
L4	RF Choke	.5Ω		32-4061-2		
L5	FM RF Coil	0Ω		32-4159-1		
L6	RF Choke	.5Ω		32-4061-2		
L7	FM Osc.Coil	0Ω		32-4015-5		
L8	RF Choke	.5Ω		32-4061-2		
L9	AM Osc.Coil	9Ω		32-4221-3	14-1060	
L10	FM 1st IF	1Ω	1.2Ω	32-4257		
L11	AM 1st IF	23Ω	20Ω	32-4258		Tertiary Winding 31Ω
L12	FM 2nd IF	1Ω	1Ω	32-4257-1		
L13	AM 2nd IF	9Ω	9Ω	32-4160-3	14-6078	
L14	Ratio Det.	1.5Ω	0Ω	32-4261-1		
L15	AM 3rd IF	12.6Ω	13Ω	32-4240-2		

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA PHILCO PART No.		NOTES
M1	Bayonet	6-8V	0.25A	Blue	34-2040		Type #44
M2	Bayonet	6-8V	0.25A	Blue	34-2040		Type #44
M3	Bayonet	6-8V	0.25A	Blue	34-2040		Type #44
M4	Bayonet	6-8V	0.25A	Blue	34-2040		Type #44

PHONO CARTRIDGE

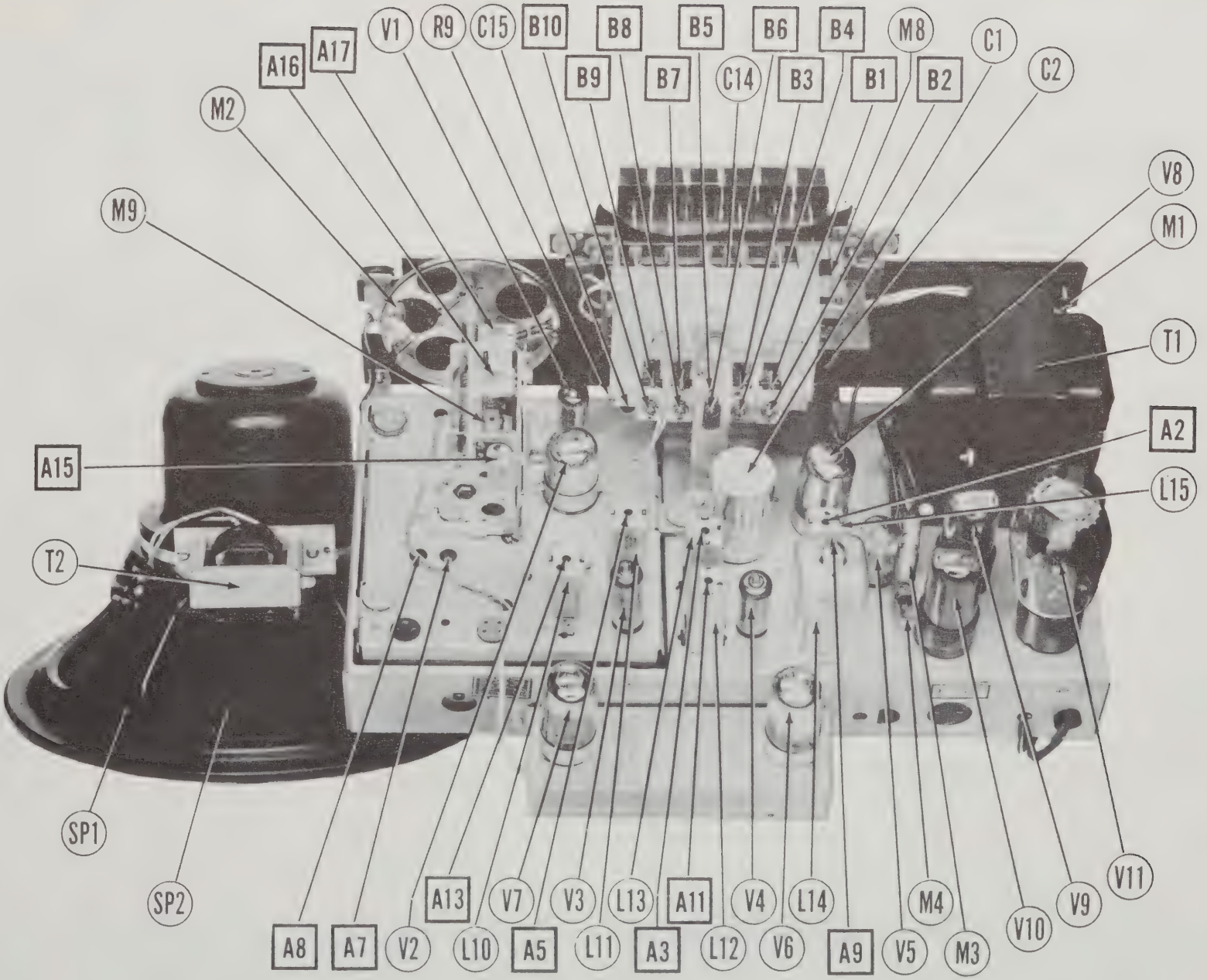
ITEM No.	REPLACEMENT DATA PHILCO PART No.	REPLACEMENT DATA ASTATIC PART No.	REMARKS
M5		M-3	Replacement

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M6	Switch	42-1877	Band
M7	Switch	42-1882	Tuning Eliminator
M8	Switch	42-1881	Power & Pushbutton
M9	Tuning Gang	31-2724-6	AM(24-522MMF, 11-247MMF)
A7	Dual Trimmer	31-6476-8	BC Osc. Adj.
A8			BC Ant. Adj.
	Cabinet	10731	
	Knob	41-1006	
	Dial Pointer	41-4442	
	Dial Scale	76-4298	

DATE 6/49 4912-9 SET #64 FOLDER 9

PHILCO
MODEL 49-1615
PAGE 5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C15
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C14
B3
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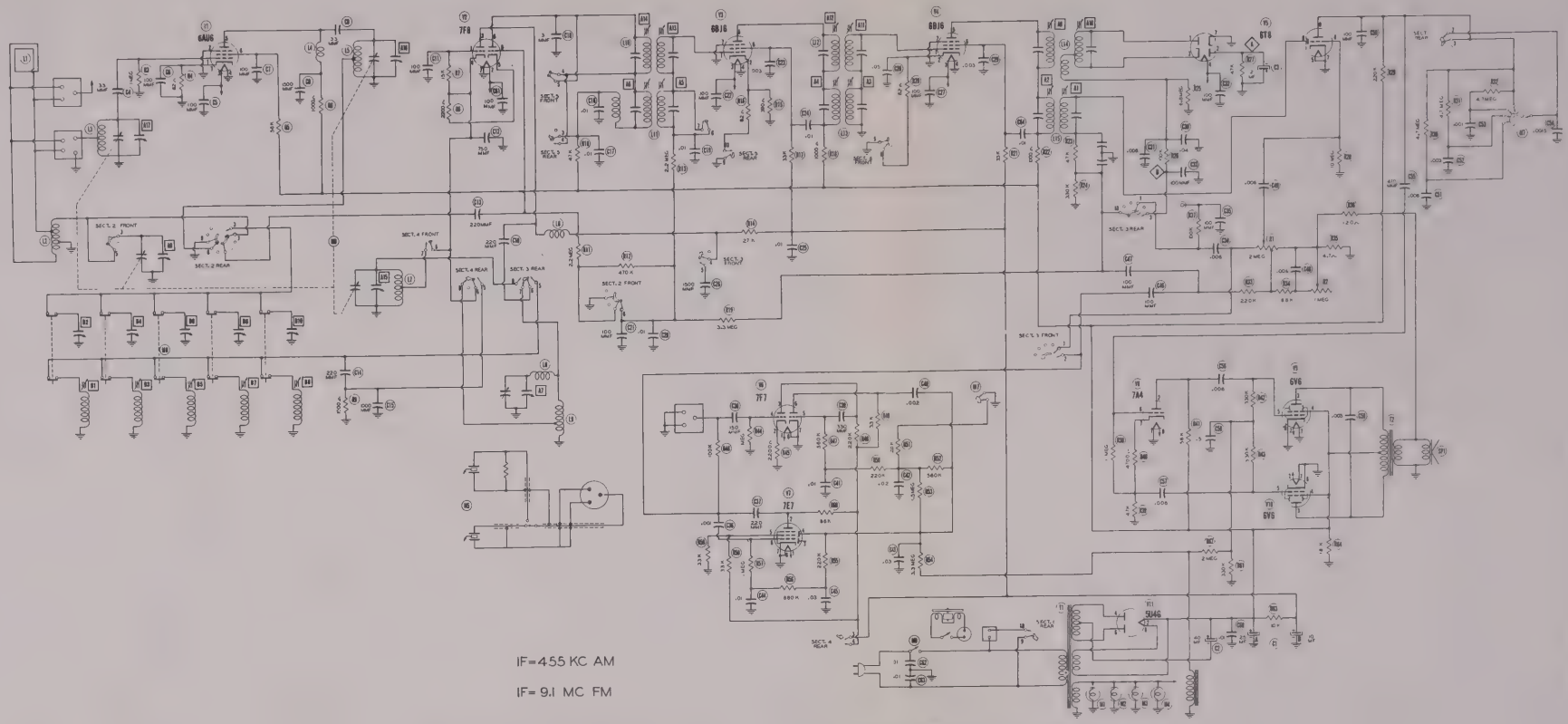

VOLTAGE READINGS

	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
*	V1	6AU6	-.5VDC	0V	6.3VAC	0V	225VDC	140VDC	115DC		
*	V2A	7F8	1-2.5VAC	6.3VAC	95VDC	0V	0VDC	175VDC	P/S	-1VDC	
	V2B	7F8	1-2.5VAC	6.3VAC	240VDC	0V	6.8VAC	175VDC	NC	-1.4VDC	
	V3	6BJ6	0V	0VDC	6.3VAC	0V	225VDC	140VDC	NC		
	V4	6BJ6	0V	.6VDC	6.3VAC	0V	225VDC	140VDC	NC		
*	V5A	6T8	-1.5VDC	-5VDC	0V	6.3VAC	0V	-10VDC	0V	-.5VDC	110VDC
	V5B	6T8	-.4VDC	-1.2VDC	-.7VDC	6.3VAC	0V	-9VDC	0V	-.5VDC	110VDC
(5)	V6	7F7	6.3VAC	1.8VDC	140VDC	0V	-.2VDC	-68VDC	0V	0V	
(5)	V7	7E7	6.3VAC	4.8VDC	-.8VDC	-.2VDC	-70VDC	-.2VDC	0V	0V	
	V8	7A4	0V	85VDC	90VDC	6.3VAC	6.3VAC	95VDC	68VDC	6.8VAC	
	V9	6V6GT	0V	6.3VAC	235VDC	230VDC	-6.8VDC	-12VDC	0V	0V	
	V10	6V6GT	0V	6.3VAC	235VDC	240VDC	-10VDC	-.6VDC	0V	0V	
	V11	5U4G	0V	20VDC	6.3VAC	260VAC	0V	260VAC	16VAC	260VDC	

*EASEN WITH VACUUM TUBE VOLTMETER

RESISTANCE READINGS

	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
*	V1	6AU6	1.75K Ω	0 Ω	0 Ω	0 Ω	1.4 MEG Ω	1.4 MEG Ω	0 Ω	0 Ω	0 Ω
*	V2	7F8	0 Ω	0 Ω	1.4 MEG Ω	0 Ω	0 Ω	470K Ω	1.4 MEG Ω	0 Ω	0 Ω
	V3	6BJ6	1.75K Ω	0 Ω	0 Ω	0 Ω	1.4 MEG Ω	1.4 MEG Ω	0 Ω	0 Ω	0 Ω
	V4	6BJ6	0 Ω	0 Ω	0 Ω	0 Ω	1.4 MEG Ω	1.4 MEG Ω	0 Ω	0 Ω	0 Ω
	V5A	6T8	6.8 MEG Ω	6.8 MEG Ω	0 Ω	0 Ω	2K Ω	340K Ω	0 Ω	0 Ω	0 Ω
(5)	V6	7F7	0Ω	2.2KΩ	470KΩ	1 MEG	470KΩ	470K Ω	0Ω	0Ω	0Ω
(5)	V7	7E7	0Ω	470KΩ	2 MEG	330KΩ	470KΩ	2 MEG	0Ω	0Ω	0Ω
	V8	7A4	∞	470K Ω	330K Ω	∞	∞	1.75 MEG Ω	330K Ω	∞	∞
	V9	6V6GT	Inf.	0Ω	470KΩ	470Ω	68KΩ	220KΩ	0Ω	0Ω	0Ω
	V10	6V6GT	Inf.	0Ω	470KΩ	470Ω	68KΩ	220KΩ	0Ω	0Ω	0Ω
	V11	5U4G	Inf.	100Ω	100Ω	800Ω	Inf.	800Ω	Inf.	100Ω	

* Measured from pin 5 of V11 (5U4G)
(5) Band switch in phono Position.
* VOLTAGE AND RESISTANCE READINGS TAKEN IN AM POSITION.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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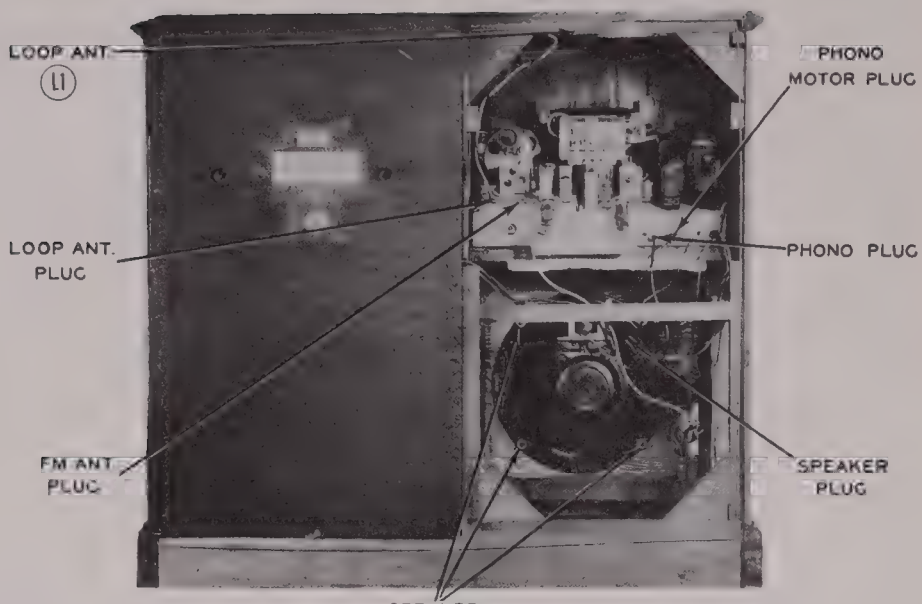
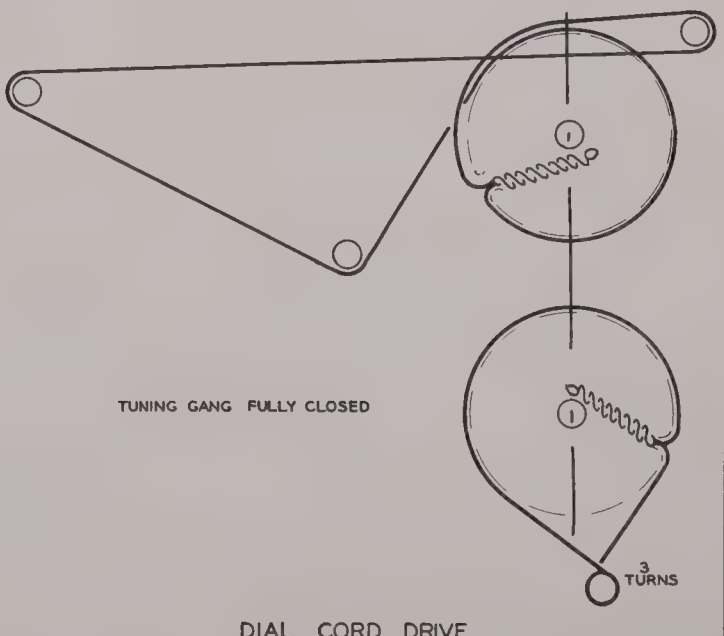


DISASSEMBLY INSTRUCTIONS

1. Remove five push-on type control knobs.
2. Remove twelve wood screws holding back cover. Remove back cover.
3. Remove phono motor , phono pick-up and AM antenna plugs from rear of chassis.
4. Remove speaker plug from speaker.
5. Remove four 3/8" hex head machine screws from underneath chassis and remove two phillips head wood screws holding push-buttons. Remove chassis.
6. Remove four 3/8" hex nuts holding speaker. Remove speaker.



DIAL CORD DRIVE

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set dial pointer turn tuning cap fully closed and set pointer 4 13/16" from extreme left edge of dial back plate. This is the calibration mark.
AM Alignment should be completed before FM Alignment is attempted.

AM ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 8 (Grid) of 7F8. Low side to chassis.	455KC	BC (1 position clockwise)	Tuning cap fully closed	Across voice coil	A1, A2 A3, A4 A5, A6	Adjust for maximum output in order given. Do not repeat.
2.		Loop (Radiate from signal generator.)	1600KC	"	5 11/16" from calibration mark.	"	A7	Adjust for maximum output.
3.		Loop	1500KC	"	Tune for maximum output.	"	A8	" " " "

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND OUTPUT METER

Attenuate output of signal generator to maintain output meter reading below 1.5 volts.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
4.	.1MFD	High side to pin 1 (Grid) of 6BA6 2nd IF tube (4). Low side to chassis.	9.1MC (400~ Amp. Mod.)	FM (2 positions clockwise)	Tuning cap fully closed	Across voice coil	A9	Detune A10. Adjust A9 for maximum output.
5.	.1MFD	High side to pin 1 (Grid) of 6BA6 1st IF tube (3). Low side to chassis.	"	"	"	"	A11, A12	" " " "
6.	.1MFD	High side to pin 8 (Grid) of 7F8. Low side to chassis.	"	"	"	"	A13, A14	Adjust for maximum output.
7.	.1MFD	"	"	"	"	"	A10	Adjust for minimum output.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.01MFD	High side to pin 1 (Grid) of 6BA6 1st IF tube (3). Low side to chassis.	9.1MC (freq. mod.)	FM (2 positions clockwise)	Tuning cap fully closed	Vertical input to point (A) Ground to chassis.	A9, A11, A12	Disconnect 2 MFD cap. C3 from point A. Adjust A9, A11 & A12 for maximum amplitude, symmetry and coincidence of pattern per Fig 1.
5.	.01MFD	High side to pin 8 (Grid) of 7F8. Low side to chassis.	"	"	"	"	A13, A14	Adjust for maximum amplitude, symmetry and coincidence of pattern per Fig 1. Reconnect cap C3 to point A.
6.	.01MFD	"	"	"	"	Vertical input to point (B) Ground to chassis.	A10	Adjust for crossover point occurring at center of pattern per Fig 2. Retouch A9 for max. amplitude & straightness of crossover lines.

FIG. 1

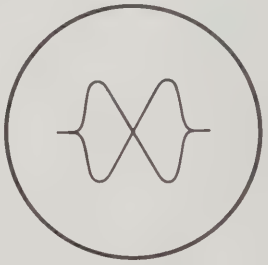


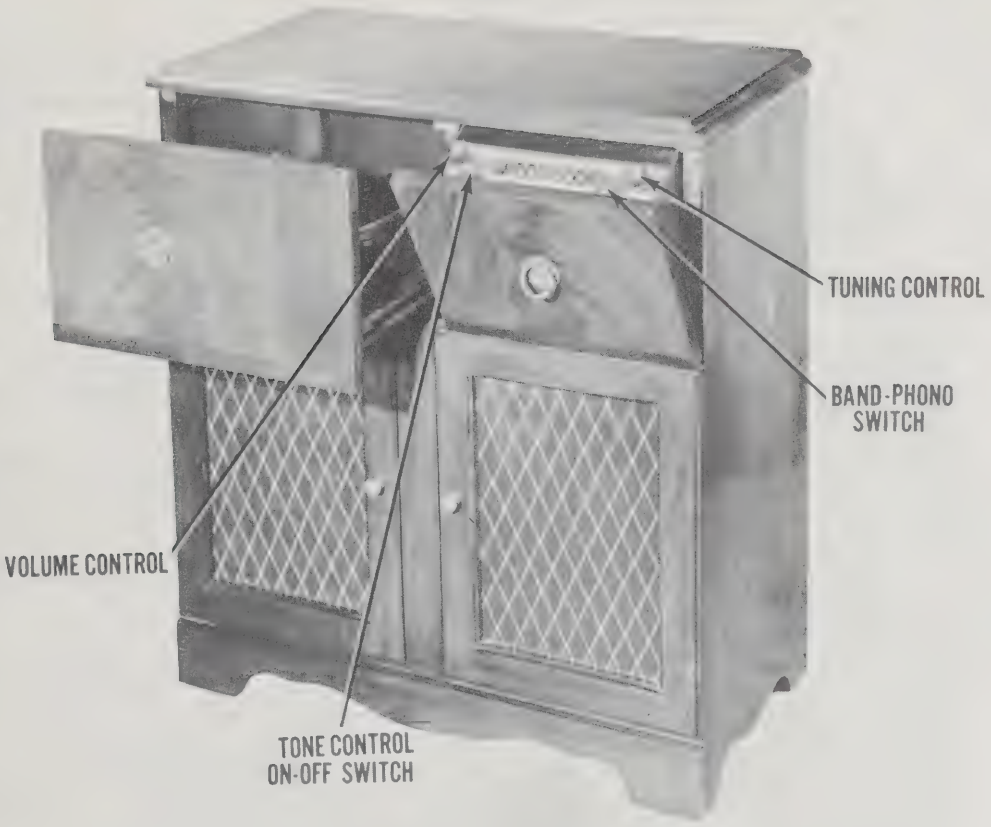
FIG. 2

FM RF ALIGNMENT

For step 10 & 11, fashion two simple dipoles, each consisting of two 30 inch lengths of rubber covered wire. Connect one dipole to pins 3 and 4 of FM antenna socket, the other dipole to output of signal generator, and radiate signal into receiver. Place the two dipole several feet apart.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
8.	Direct	High side to pin 4 of FM Antenna Socket. Low side to chassis.	105MC (400~ Amp. mod.)	FM	4 11/16" from calibration mark	Across voice coil	A15	Adjust for maximum output.
9.	Direct	"	92MC (400~ Amp.mod.)	"	1 5/16" from calibration mark	"	FM Osc Coil (L7)	Compress or expand coil slightly for maximum output. Repeat steps 8 & 9 until no further improvement can be made.
10.	(See pre-alignment notes)		105MC (400~ Amp. mod)	"	Tune for maximum output.	"	A16, A17	Rock tuning cap and adjust A16 and A17 for maximum output.
11.	"		92MC (400~ Amp.mod.)	"	"	"	FM RF & Ant. Coils (L5 & L3)	Compress or expand coil slightly for maximum output while rocking tuning cap. Repeat steps 10 & 11 until no further improvement can be made.

SILVERTONE MODELS 8107A, 8108, 8108A (Ch. 101.851) 8109 (Ch. 101.851-1



SILVERTONE MODELS 8107A, 8108, 8108A (Ch. 101.851) 8109 (Ch. 101.851-1

SILVERTONE MODEL 8108A

TRADE NAME	Silvertone, Models 8107, 8108, 8108A (Ch. 101.851), 8109 (Ch. 101.851-1)
SUPPLIER	Sears, Roebuck & Co., 925 S. Homan St., Chicago, Illinois
TYPE SET	AC Operated Combination Phono-Radio, AM-FM Superheterodyne Receiver with Loop Antenna.
TUBES(SEVEN)	Types 7F8 Converter, 6BA6 1st IF Amp., 6BA6 2nd IF Amp., 7A6 FM Discriminator, 7B6 AM DET-AVC-AF, 7C5 Power Output, 7Y4 Rectifier
POWER SUPPLY	110-120 Volts AC RATING .41 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	535-1650KC FREQ. MOD. 88-108MC

DISASSEMBLY INSTRUCTIONS

1. Remove phono motor plug and phono pickup plug from rear of chassis.
2. Disconnect speaker plug from rear of chassis.
3. Remove four 11/32" hex type nuts holding speaker. Remove speaker.
4. Remove four push-on type control knobs.
5. Remove two antenna leads at chassis and one lead at loop.
6. Remove two wood screws holding balancing lever to cabinet.
7. Pull chassis out front by pulling on chassis drawer handle.
8. Remove two metal screws on each side of chassis mounting.
9. Remove chassis.

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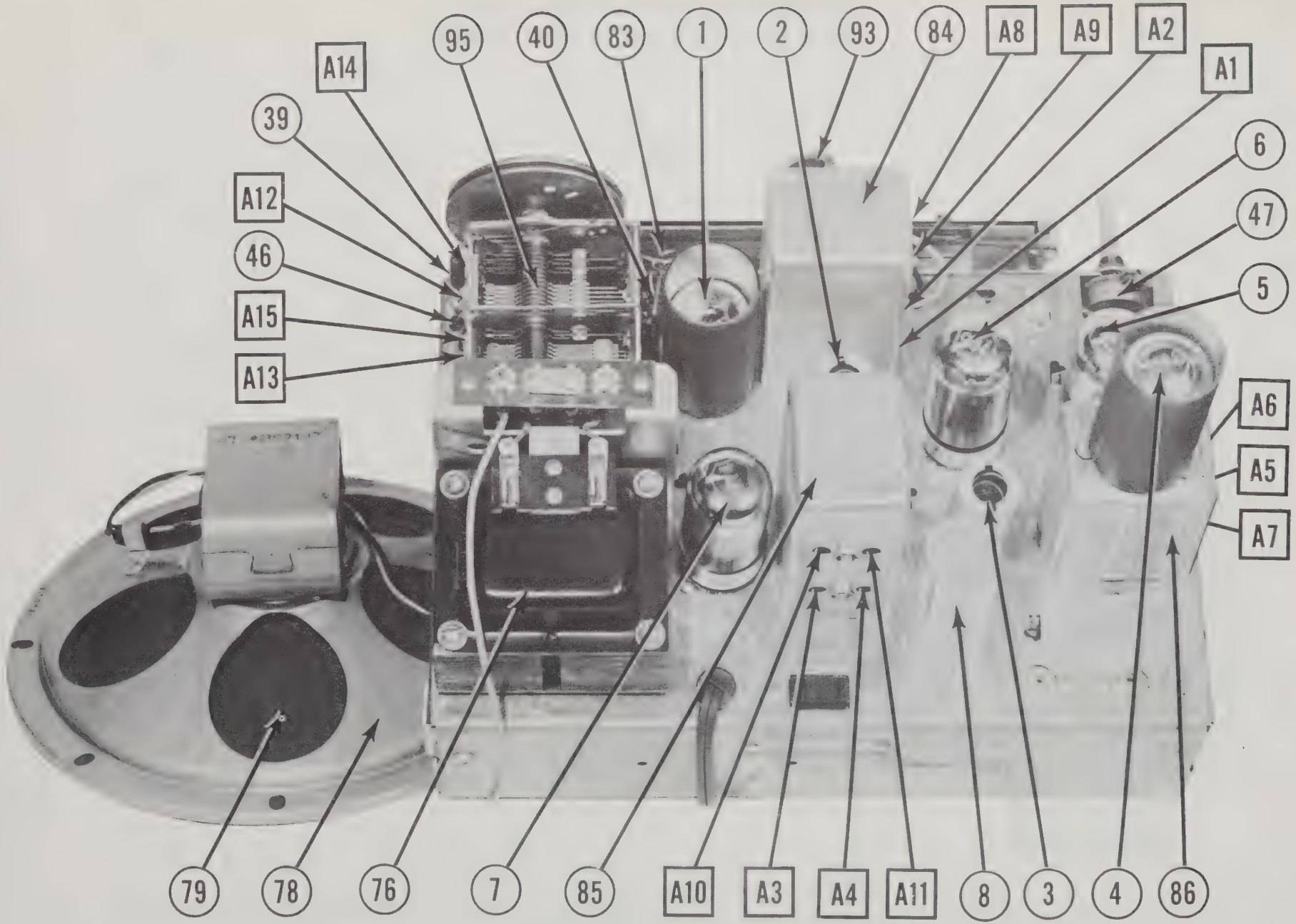
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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	7F8	7F8	8BW	
2	1st IF Amp.	6BA6	6BA6	7BK	
3	2nd IF Amp.	6BA6	6BA6	7BK	
4	FM Discriminator	7A6	7A6	7AJ	
5	AM DET-AVC-AF	7B6	7B6	8W	
6	Power Output	7C5	7C5	6AA	
7	Rectifier	7Y4	7Y4	5AB	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SILVERTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	30	300	R67029	AF64K4A	UP6BJ37		DY-309	EL-323	■Filter
B	30	250			BR202A				▲Filter
C	20	25							Cathode Bypass
9	2	5	R64915	PRS150/4	BR245		M-4-150	D7994	Stabalizing Cap
10	.005	600		P688-005	GT6D5		ST-6-005	TM-25	Output Plate Bypass
11	.01	400		P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Audio Coupling
12	.01	400		P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Audio Coupling
13	.01	400		P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Audio Coupling
14	.01	400		P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Tone Comp
15	.01	120		P488-01	GT2S1	GP2-335-01	ST-4-01	TM-11	Tone Comp
16	.05	400		P488-05	GT4S5		ST-4-05	TM-15	2nd IF Plate Decoup.
17	.02	400		P488-02	GT4S2		ST-4-02	TM-12	2nd IF Screen Bypass
18	.02	200		P488-02	GT2S2		ST-4-02	TM-12	2nd IF Cathode Bypass
19	.02	200		P488-02	GT2S2		ST-4-02	TM-12	AVC Filter
20	.02	400		P488-02	GT4S2		ST-4-02	TM-12	1st IF Plate Decoup.
21	.005	400		P488-005	GT6D5	GP2M-005	ST-6-005	TM-25	1st IF Screen Bypass
22	.02	200		P488-02	GT2S2		ST-4-02	TM-12	1st IF Cathode Bypass
23	.02	200		P488-02	GT2S2		ST-4-02	TM-12	AVC Filter
24	.05	400		P488-05	GT4S5		ST-4-05	TM-15	RF Bypass Pwr. Supply
25	.002	600		P688-002	GT6D2	GP2M-002	ST-6-002	TM-22	IF Coupling
26	.01	400		P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Cathode Bypass
27	100	500		1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	AF Plate Bypass
28	500	500		1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	RF Bypass
29	250	500		1468-00025	5W5T25	GP2K-250	MO.5-325	1FM-325	IF Coupling
30	50	500		1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	RF Bypass
31	750	500		1468-00075	1W5T7	GP2K-750	MO.3-37	1FM-37	Deemphasis
32	50	500		1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	FM Osc. Feedback
33	100	500		1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	AM Osc. Feedback
34	50	500		1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Osc. Grid Cap
35	4	300	R66215	1469-000005	5R5V5	NPOK-5	MOS.5-55	MS-55	Osc. Plate Bypass
36	10	500		1468-00001	5W5Q1	GP1K-10	MO.5-41	MS-41	Osc. Cathode Bypass
37	6	300	R66213	1469-000005	5R5V5	NPOK-5	MOS.5-55	MS-55	Conv. Plate Bypass
38	50	500		1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Conv. Cathode Bypass
39	6	300	R66213						Fixed Trimmer
40	3	300	R66214			MPOK-3			Osc. Coupling
41	250	500		1468-00025	5W5T25	GP2K-250	MO.5-325	1FM-325	RF Bypass
42	10	500		1468-00001	5W5Q1	GP1K-10	MO.5-41	MS-41	RF Coupling
43	50	500		1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Ext. FM Ant. Coupling
44	50	500		1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Ext. FM Ant. Isolation
45	200	500		1468-0002	5W5T2	GP2K-200	MO.5-32	1FM-32	FM Line Ant. Coupling
46	15	300						MS-415	Fixed Trimmer Note

Note - Not used in all models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SILVERTONE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
47A	1 Meg	½	R66194	D18-137X	T-103	Volume control tapped @ 100KΩ
B	Shaft		Not Req.	A	Not Req.	Attach to 47A per instr.
48A	1 Meg	½	R66195	D13-137	M-63-Z	Tone control
B	Shaft		Not Req.	A	Not Req.	Attach to 48A per instr.
C	Switch		Not Req.	41	SW-A	Attach to 48A per instr.

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: MEISSNER PART No.	
80	AM Loop Ant.	0Ω	1.5Ω	R66185		
81	FM Ant Coil		0Ω	R66187		
82	AM Osc.Coil		2.5Ω	R66184		
83	FM Osc.Coil		0Ω	R66186		
84A	AM 1st IF		12.5Ω	R66181		
B	FM 1st IF	1Ω				
85A	AM 2nd IF	12Ω	12.5Ω	R66182		
B	FM 2nd IF					
86	FM Disc. XFMR	1.8Ω		R67043		
87	FM RF Cath. Choke		.5Ω	R66189		
88	FM RF Plate Choke		.5Ω	R66188		
89	Line Choke		0Ω	R66180		
90	Line Choke		0Ω	R66180		
91	Filament Choke		0Ω	R66180		
92	Filament Choke		0Ω	R66180		

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA	NOTES
93	Bayonet	6-8V	0.15A	Brown			Type #47

MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
94	Switch	R66196	Band-Phono
95	Tuning Gang	R66190	(36-540MMF, 19-197MMF)
	Dial	R66160	
	Knob	R62792	Band-Phono
	Knob	R62534	Tone-On/Off
	Knob	R62712	Tuning
	Knob	R62531	Volume

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	SILVERTONE PART No.	IRC PART No.	
49	1.2MΩ	½		BTS-1.2M	Osc. Grid
50	27KΩ	½		BTS-27K	Osc. Plate
51	12Ω	½			Parasitic Supp.
52	1500Ω	½		BTS-1500	Conv. Cathode
53	1 Meg	½		BTS-1 Meg	Conv. Grid
54	47KΩ	½		BTS-47K	Conv. Plate Decoup.
55	68Ω	½			1st IF Cathode
56	27KΩ	1		BTA-27K	1st IF Screen
57	470Ω	½		BTS-470	1st IF Plate Decoup.
58	100KΩ	½		BTS-100K	AVC Net.
59	2.2 Meg	½		BTS-2.2 Meg	AVC Net.
60	68Ω	½			2nd IF Cathode
61	27KΩ	1		BTA-27K	2nd IF Screen
62	4700Ω	½		BTS-4700	2nd IF Plate Decoup.
63	100KΩ	½		BTS-100K	Diode Filter
64	270KΩ	½		BTS-270K	Diode Load
65	150KΩ	½		BTS-150K	Wire Recorder Shunt
66	3.3 Meg	½		BTS-3.3 Meg	Series Wire Recorder
67	1 Meg	½		BTS-1 Meg	Series Phono
68	47KΩ	½		BTS-47K	Tone Comp.
69	47KΩ	½		BTS-47K	Tone Comp.
70	10 Meg	½		BTS-10 Meg	AF Grid
71	470KΩ	½		BTS-470K	AF Plate Load
72	470KΩ	½		BTS-470K	Output Grid
73	270Ω	1		BW-1-270	Output Cathode
74	47Ω	½		BW-½-47	Parasitic Supp.
75	2000Ω	5	R62773	AB-2000	Filter

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	SILVERTONE PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
76	117VAC @ .41A	370VCT .06A DC	6.3VAC @ 2.4A		R66191	P-6011*	PH-70B*	F-3048

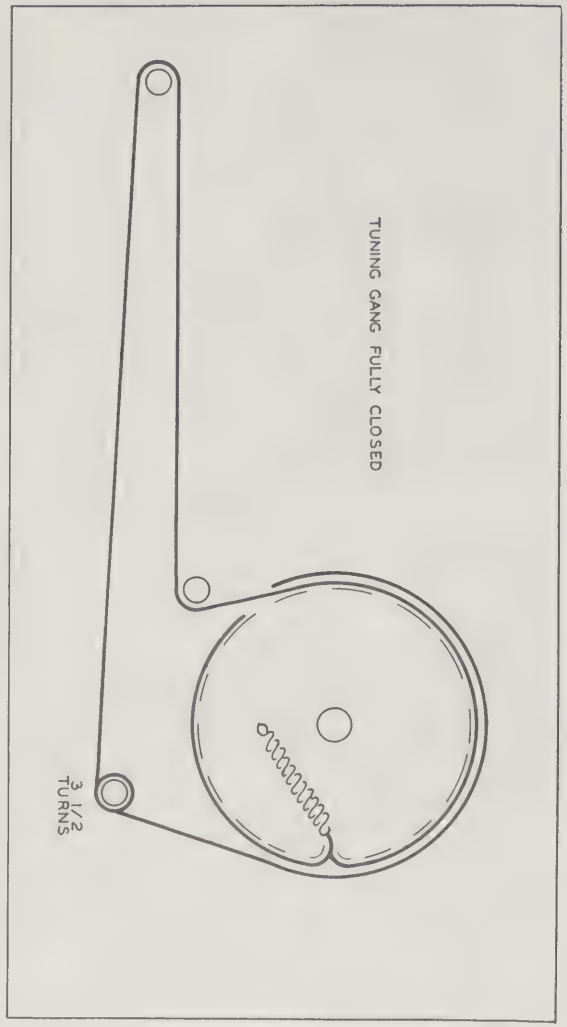
*Add Series Resistor To Reduce Plate Voltage

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		SILVERTONE PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
77	6400Ω	3.2Ω	290Ω Tap @ 95Ω	.3Ω	R66192			A-3430#	#Drill One New Mounting Hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	V.C. IMP.	SILVERTONE PART No.	JENSEN PART No.	QUAM PART No.	
78A	1W	3.2Ω	R67187	ST-11s MOD.P8-V	8A81	
78A	2.25 DIA.	V2 DIA.				
78B	7-1-8	3/4 I.P.	R67187 R67212 R67188 R67681			
78C						
78C						



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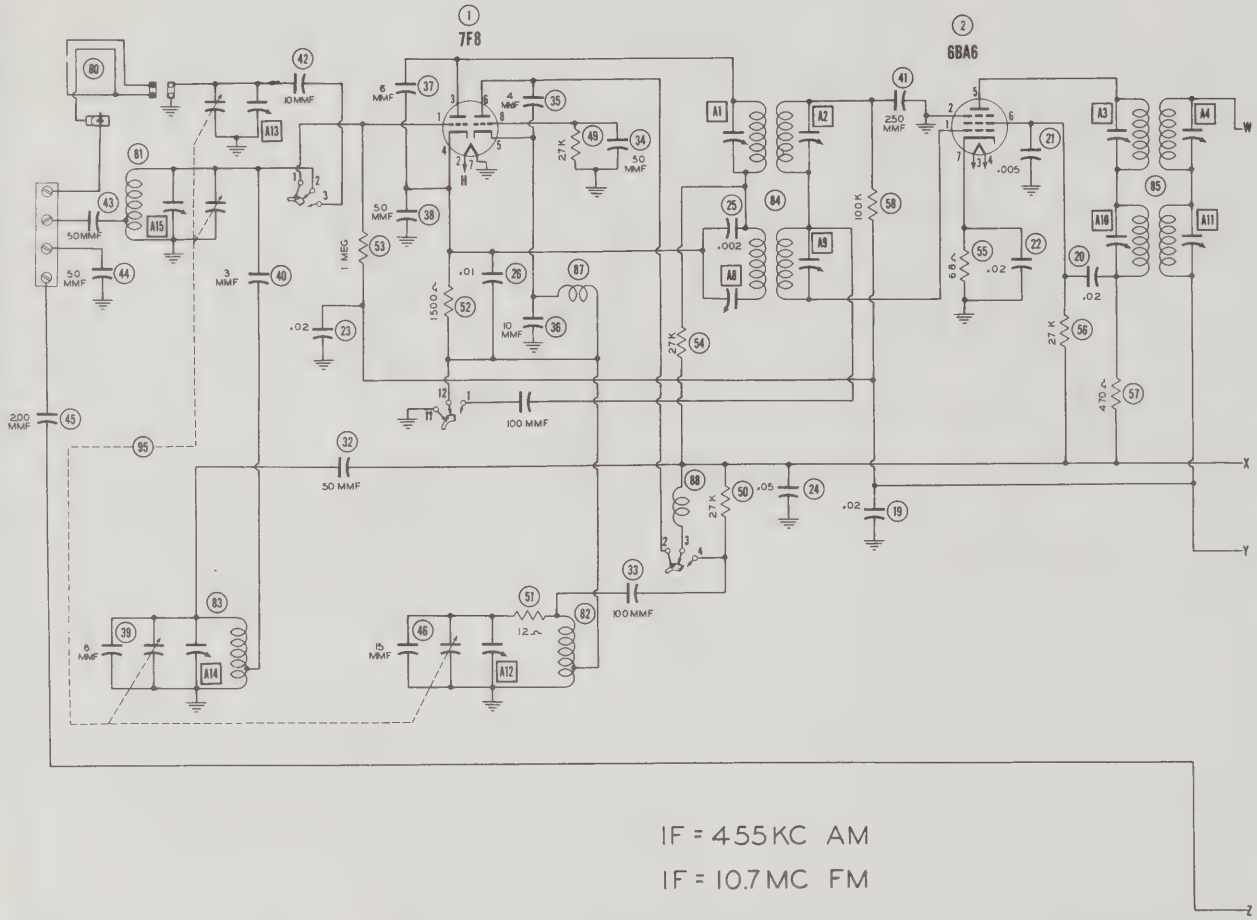

VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1A	7F8	-.4VDC	6.6VAC	166VDC	3VDC	0V	125VDC	0V	§-2.4VDC
‡1B	7F8	0V	6.6VAC	122VDC	3VDC	0V	195VDC	0V	§-8VDC
2	6BA6	-.4VDC	0V	0V	6.6VAC	212VDC	115VDC	1VDC	
‡3	6BA6	-.6VDC	.6VDC	0V	6.6VAC	180VDC	110VDC	.6VDC	
‡4	7A6	6.6VAC	.2VDC	.6VDC	0V	0V	0V	.5VDC	0V
5	7B6	0V	87VDC	-.6VDC	0V	-.6VDC	-1VDC	0V	6.6VAC
6	7C5	0V	250VDC	210VDC	250VDC	210VDC	0V	11VDC	6.6VAC
7	7Y4	6.6VAC	0V	260VAC	0V	0V	260VAC	280VDC	0V

§TAKEN WITH VACUUM TUBE VOLTMETER.

‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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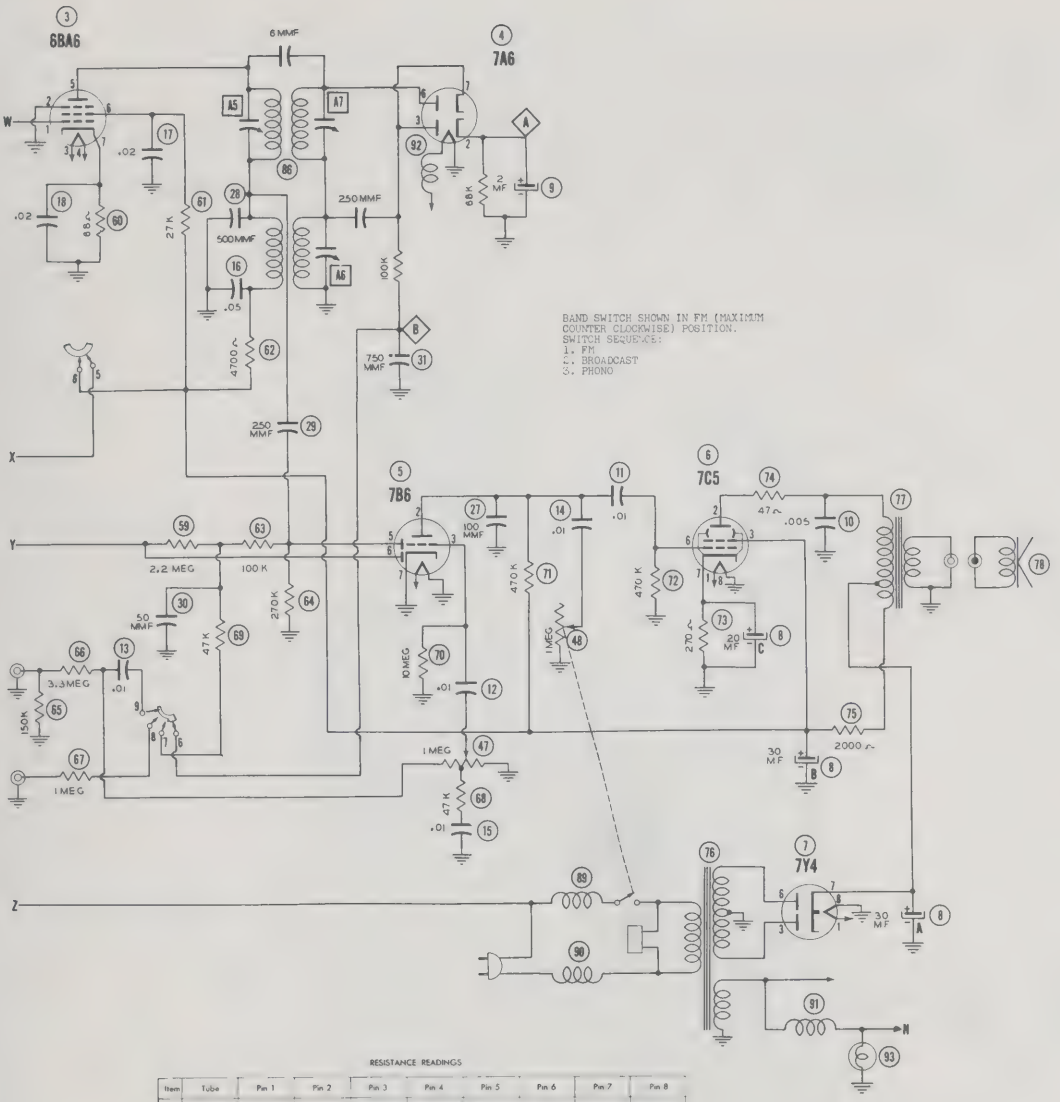

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1A	7F7	3.7 Meg.	.1Ω	1 Me.	1.5K	4.3Ω	150KΩ	—	47K
1B	7F7	3.7 Meg.	.1Ω	1 Me.	1.5K	4.3Ω	120KΩ	—	47K
2	6BA6	4.. Meg.	—	7Ω	.1Ω	120KΩ	150KΩ	5Ω	
3	6BA6	3 Meg.	—	6Ω	.1Ω	120KΩ	150KΩ	—	
4	7A6	.1Ω	68KΩ	Inf.	Inf.	0Ω	1.8Ω	Inf.	0Ω
5	7B6	0Ω	590KΩ	10 Meg.	—	3 Meg.	270KΩ	2	1.1Ω
6	7C5	0Ω	120KΩ	120KΩ	1.5K	120KΩ	470KΩ	270Ω	.1Ω
7	7Y4	.1Ω	0Ω	130Ω	Inf.	Inf.	140Ω	120KΩ	—

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To make dial available for calibration purposes, remove two snap buttons holding dial back plate and remove black dial back plate. To set dial pointer, turn tuning cap fully closed and set pointer to last reference mark at low frequency end of dial.

Use insulated alignment screwdriver for adjustment.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Attenuate output of signal generator to maintain VTVM reading of approximately 2.5 Volts.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.1MFD	High side to pin 1 (Grid) of #7F8 Low side to chassis.	10.7MC (Unmod.)	FM (counter clock-wise)	Tuning cap fully closed	DC Probe to Point (A) Common to chassis.	A1,A2 A3,A4 A5	Adjust for maximum deflection.
2.	.1MFD	"	"	"	"	DC Probe to Point (B) Common to chassis.	A6,A7	Connect output meter across voice coil. Adjust A6 for zero deflection on VTVM. Adjust A7 for minimum audio output. Continue with AM Alignment in step 3.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use freq. mod. signal with 60~ modulation and 600KC sweep.

Connect the synchronized sweep voltage from the signal generator to horizontal input of scope. If signal generator does not have this provision, the sync. voltage may be taken from the power line. If a double trace pattern is obtained rotate phase control to obtain a single pattern. If scope does not have phase control, or sync. voltage is taken from power line, the same thing may be accomplished by inserting a cap. of suitable value. (.01 to .1MFD) between voltage source and scope horizontal input.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
1.	300Ω carbon res.	High side to pin 1 (Grid) of 7F8. Low side to chassis.	10.7MC (freq. mod.)	FM	Tuning cap fully closed	Vertical input to point (A) Ground to chassis.	A1,A2 A3,A4	Disconnect 2MFD cap (9) from point A. Adjust A1 thru A4 for maximum symmetry and coincidence of pattern per Fig 1. Reconnect cap. (9) to point A.
2.	300Ω carbon res.	"	"	"	"	Vertical input in series with 50KΩ resistor to point (B) Ground to chassis.	A5,A6 A7	Adjust A5 for maximum amplitude of pattern and A6 & A7 for maximum straightness of diagonal line with center of diagonal line in center of scope horizontal sweep line per Fig 2. Continue with AM Alignment in Step 3.

FIG. 1

AM ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
3.	.1MFD	High side to pin 1 (Grid) of 7F8. Low side to chassis.	455KC	AM (center position)	Tuning cap fully closed	Across voice coil	A8,A9 A10, A11	Adjust for maximum output.
4.		Loop	1600KC	"	1600KC	"	A12	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum.
5.		Loop	1400KC	"	Tune for maximum output.	"	A13	Adjust for maximum output.

FIG. 2

FM RF ALIGNMENT USING FM SIGNAL GENERATOR AND OUTPUT METER

Use freq. mod. signal with 60~ modulation and 45KC sweep.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
6.	2-120Ω carbon res.	Each side in series with 120Ω to FM Ant. terminals.	108MC (freq. mod.)	FM	108MC	Across voice coil	A14	Adjust for maximum output. If two peaks are found, set A14 to lowest capacity setting.
7.	2-120Ω carbon res.	"	106MC (freq. mod.)	"	Tune for maximum output.	"	A15	Rock tuning cap and adjust for maximum output.

FM RF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Attenuate output of signal generator to maintain VTVM reading of approximately 2.5 Volts.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	2-120Ω carbon res.	Each side in series with 120Ω to FM Ant. terminals.	108MC (Unmod.)	FM	108MC	DC Probe to Point (A) Common to chassis.	A14	Adjust for maximum deflection.
7.	2-120Ω carbon res.	"	106MC (Unmod.)	"	Tune for maximum deflection.	"	A15	Rock tuning cap and adjust for maximum deflection.

PHOTOFACT* Folder

SPARTON MODELS
4900TV, 4939TV, 4940TV, 4941-TV

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Model 4940TV

SPARTON MODELS
4900TV, 4939TV, 4940TV, 4941-TV

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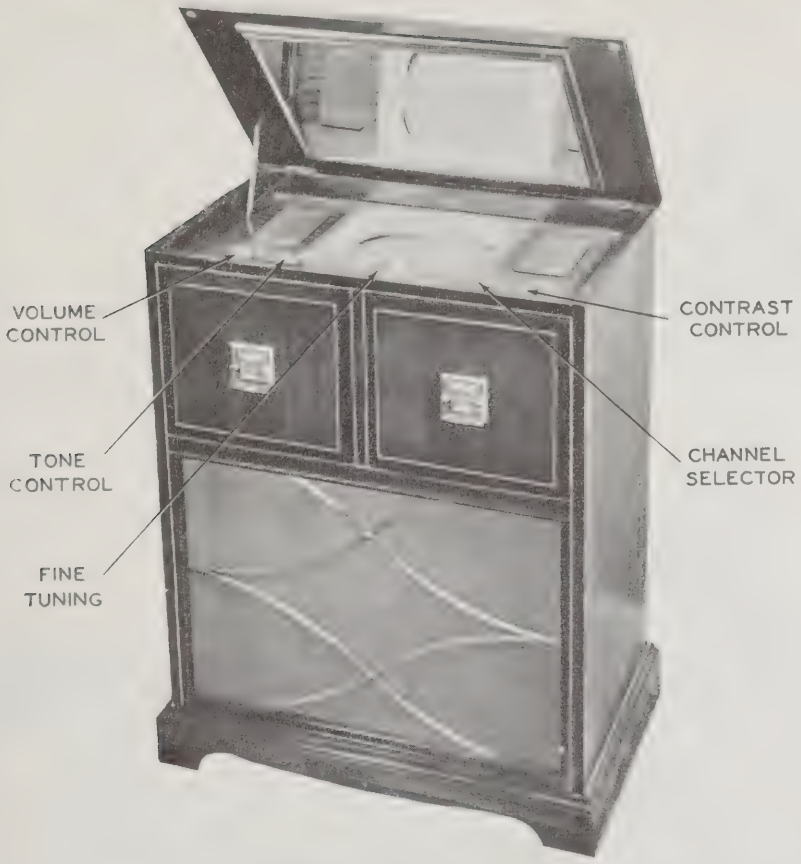
Date 6/49—No. 4912-11 Set No. 64—Folder No. 11

PHOTOFACT* Folder

*TRADE MARK

SPARTON MODELS 4900TV, 4939TV, 4940TV, 4941TV



SPARTON MODEL 4940TV

TRADE NAME	Sparton Models 4900TV, 4939TV, 4940TV, 4941TV, (Chassis 24TV9, 24TV9C, 3TV9, 3TV9C, 9L8A.)
MANUFACTURER	Sparks-Withington Co., Jackson, Michigan
TYPE SET	Television-Receiver (TV-AM-FM- Phono Combination Model 4900TV only).
TUBES	Twenty-eight (Thirty-seven, Model 4900TV)
POWER SUPPLY	117 Volts, 60 cycle AC RATING 1.96 Amps on TV, .55 Amps on Radio @ 117 Volts
TUNING RANGE	Channels 2 through 13, 540-1620KC FREQ. MOD. 88-108MC

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SPARTON MODELS 4900TV, 4939TV, 4940TV, 4941TV

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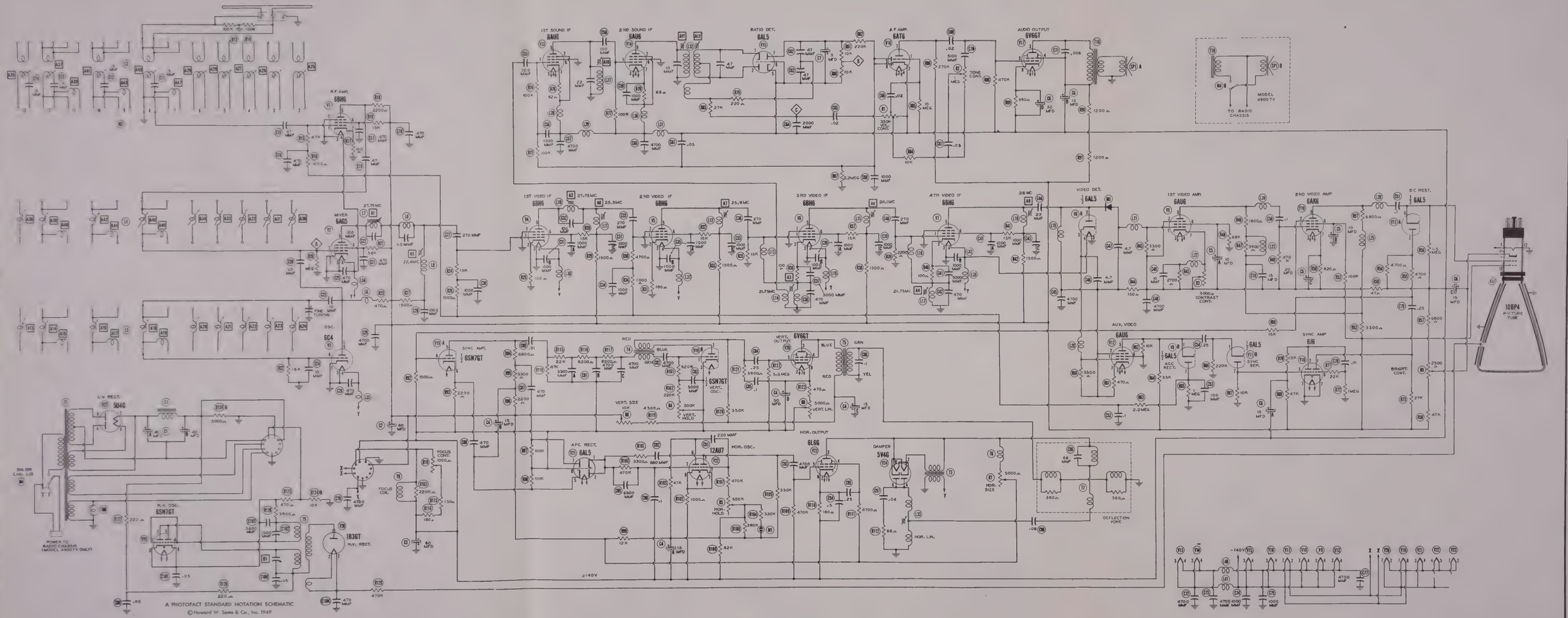
DATE 6/49 4912-11 SET #64 FOLDER 11


SPARTON MODELS
4900TV, 4939TV, 4940TV, 4941TV
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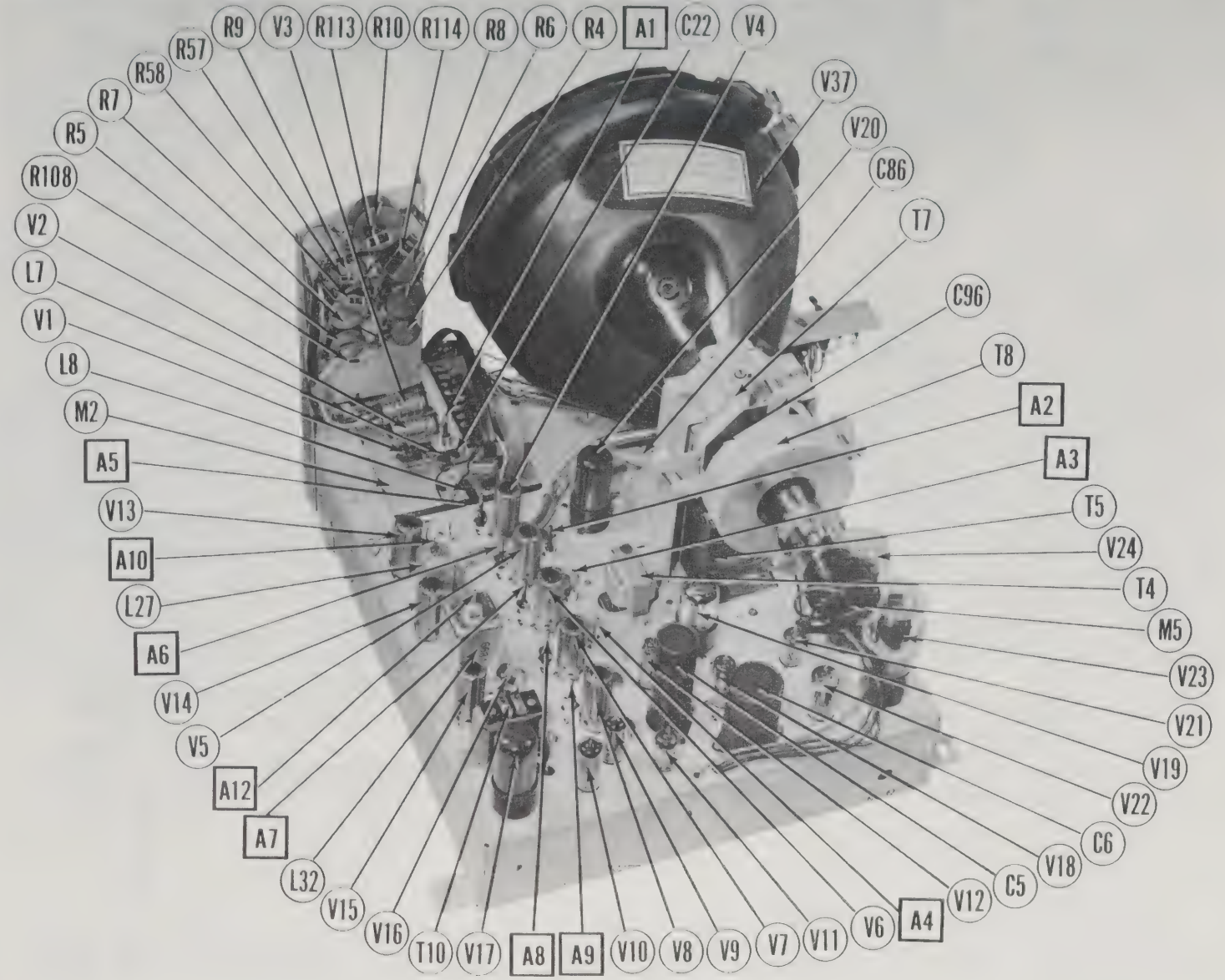
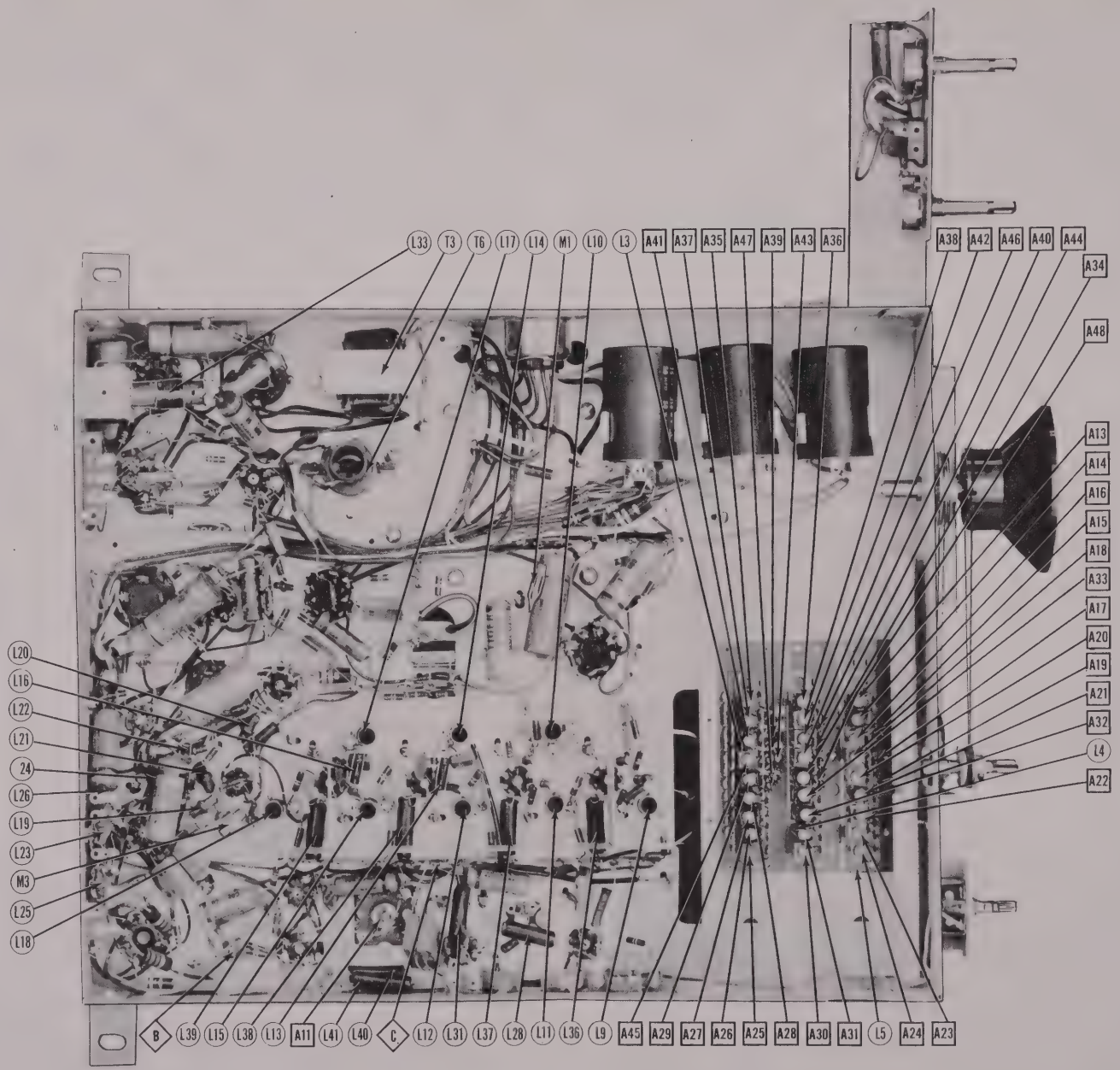
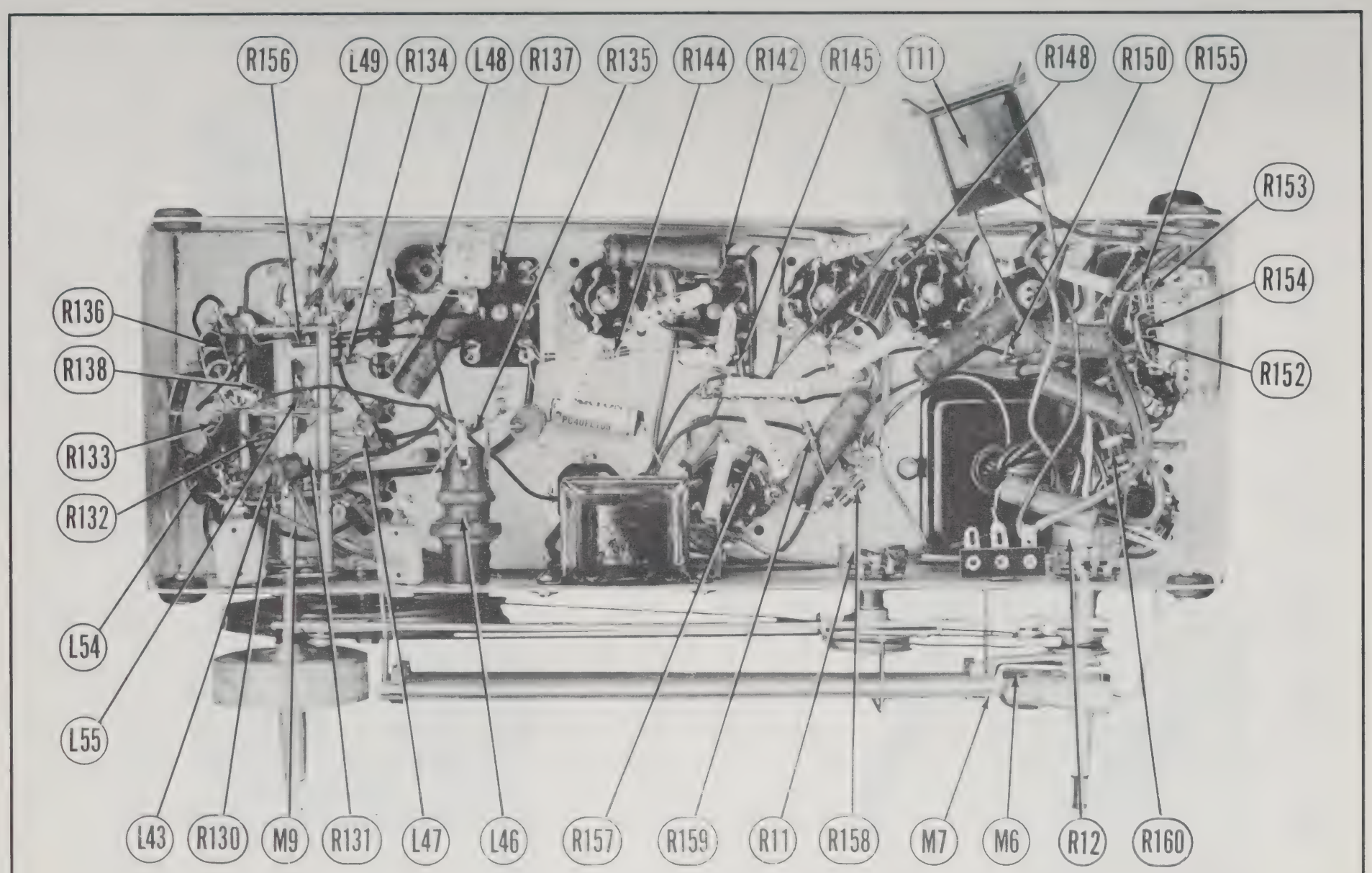


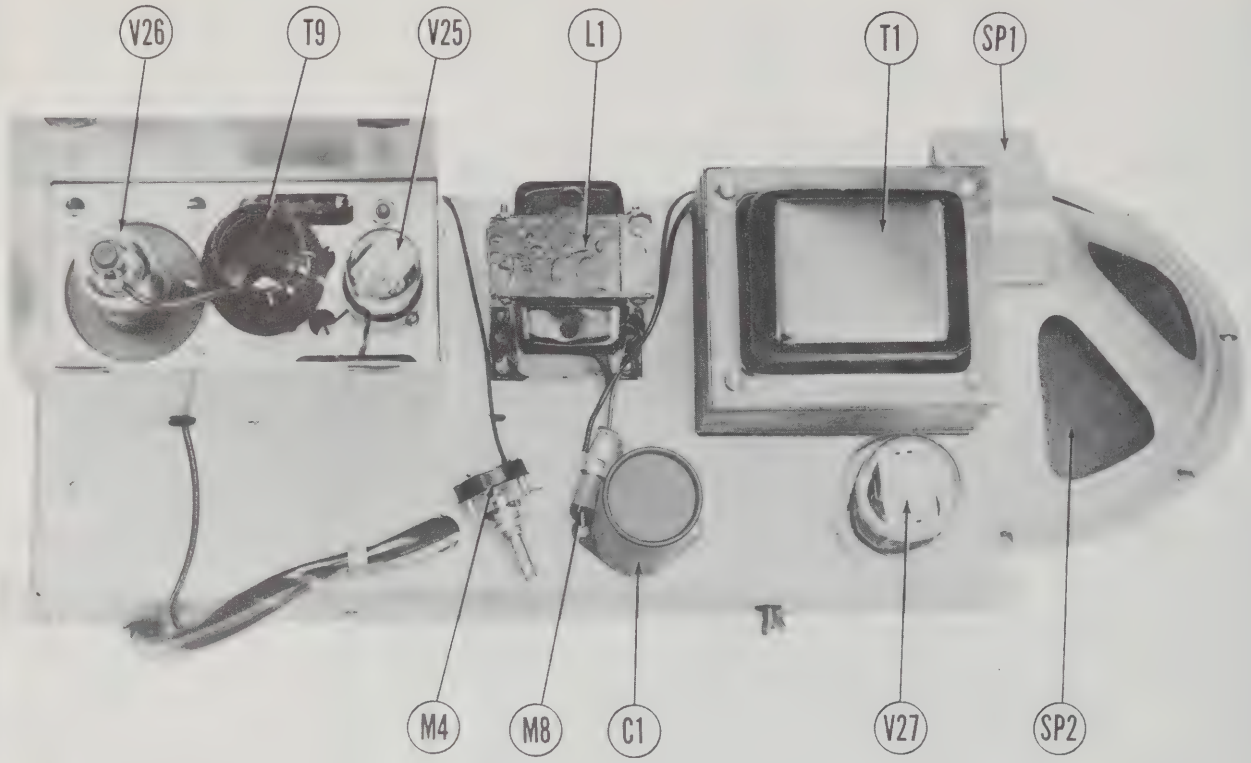
CHASSIS TOP VIEW



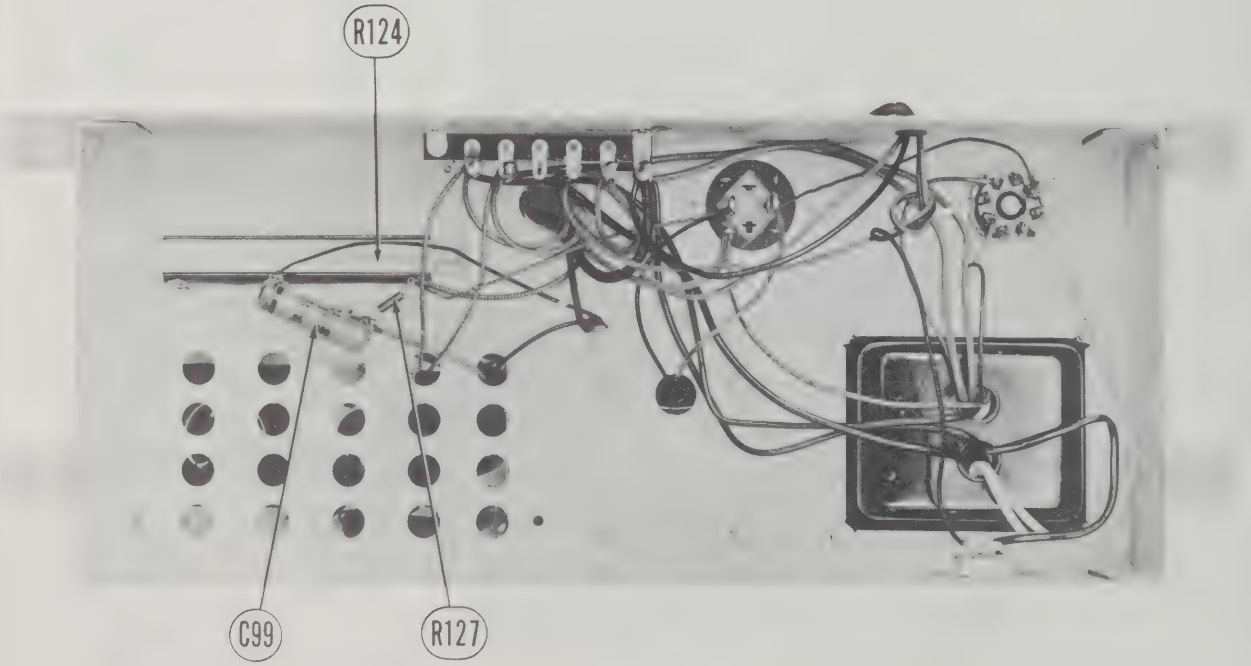
CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



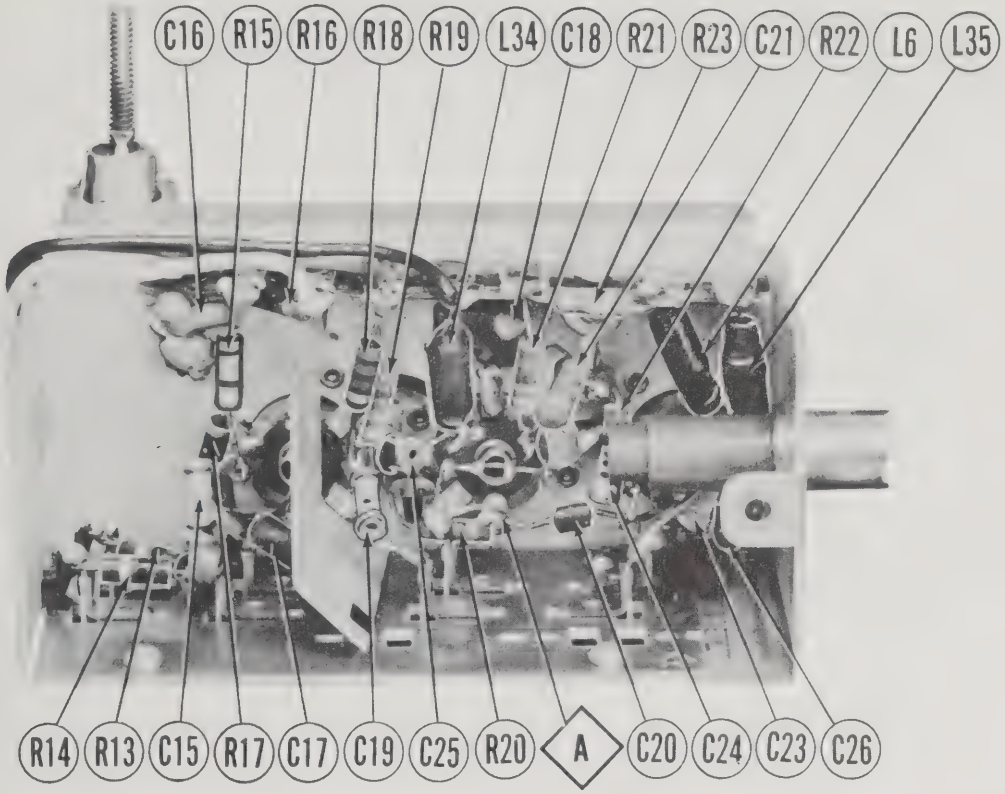
AM-FM CHASSIS - BOTTOM VIEW



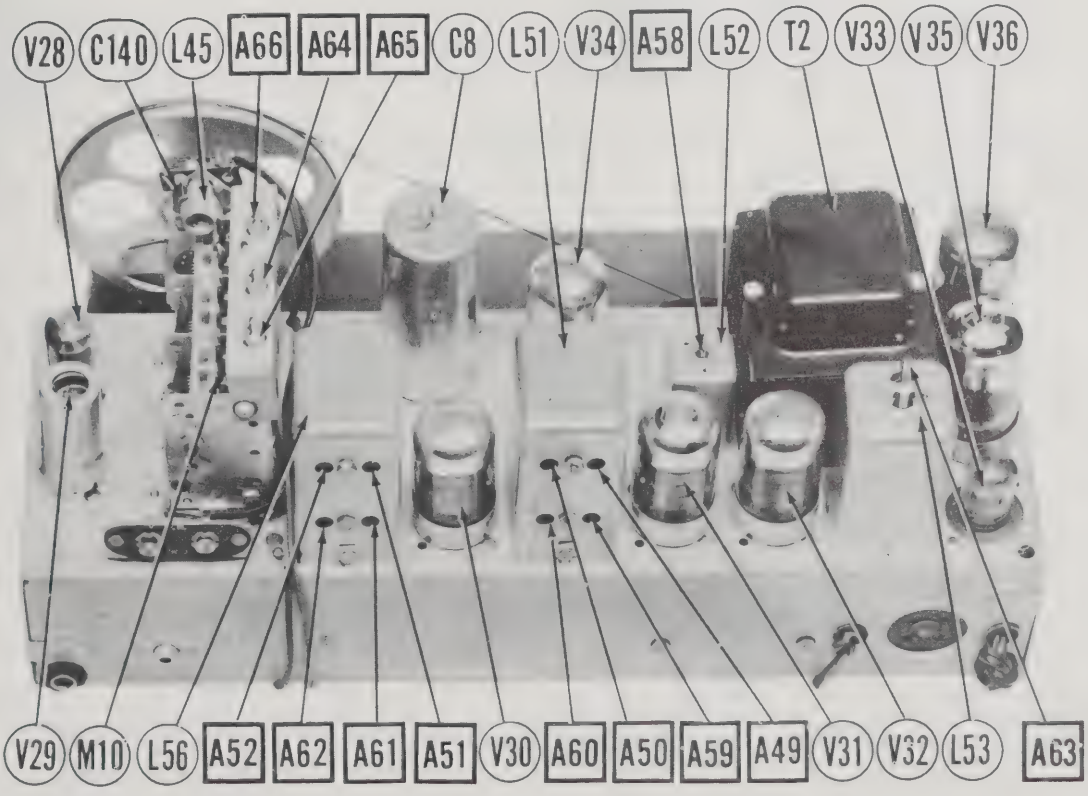
POWER SUPPLY CHASSIS-TOP VIEW



POWER SUPPLY CHASSIS-BOTTOM VIEW



RF TUNER-LEFT SIDE



AM-FM CHASSIS-TOP VIEW

TV ALIGNMENT INSTRUCTIONS

Before starting the alignment of this receiver, pre-set the controls as follows:
Picture Control to center position, Brightness Control to position where raster is visible,
Focus Control to position where focus is obtained, Vertical Hold to center position,
Vertical Linearity center position, Vertical Size to normal raster height, Horizontal Hold center position,
Horizontal Size, to normal raster width.
If the video IF channel is badly out of alignment and oscillating, it is recommended to pre-set the adjustments as follows to stop the oscillations.

"A" Adjustments	Slug Position
A1	Out
A2	Out
A3	In
A4	In
A5	In
A6	In
A7	Out
A8	Out
A9	Out

Remove the RF Amp. tube V1 and the oscillator tube V3 and connect the signal generator to Point A thru the input adapter shown in Fig 1 keeping all leads as short as possible.
Also connect a 3 volt bias battery to the AGC buss. Negative to AGC line-positive to chassis.
CAUTION: If the common lead of the VTVM being used is grounded to the meter case it is necessary to insulated the meter case from the receiver chassis. If not, the -149V bias line will be shorted out.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1	See Pre-alignment Instr.	High side thru input adapter to point A. Low side to chassis.	27.75MC	2	Across resistor R43	A1,A2	Adjust for minimum deflection.
2	"	"	21.75MC	"	"	A3,A4	" " " "
3	"	"	22.4MC	"	"	A5	Adjust for maximum deflection.
4	"	"	22.5MC	"	"	A6	" " " "
5	"	"	25.9MC	"	"	A7	Adjust for maximum deflection. If when making this adjustment, the IF strip should start oscillating, turn A7 to point where oscillation ceases. Adjust A8 and A9 at their proper frequencies and then realign A7.
6	"	"	24.1MC	"	"	A8	Adjust for maximum deflection.
7	"	"	26.0MC	"	"	A9	Adjust for maximum deflection. If overall IF response check is not being made, continue with step 9.

OVERALL TV IF RESPONSE CHECK

Connect the oscilloscope as shown in Fig 2. The filter circuit of two capacitors makes possible the grounding of the oscilloscope to the receiver chassis without shorting out the -140 volt bias supply.
Small ripples may occurr on pattern which is due to feedback from the horizontal oscillator circuit. However, never remove the horizontal oscillator tube (V22) or the damper tube (V24) as the removal of either of these tubes will result in excessive plate current in V23 (Horizontal output tube) and will eventually burn out R7 (Horizontal size control).

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8		High side thru input filter of Fig. 1 to Point A. Low side to chassis.	24MC (10MC SWeep)	21.75MC 22.7MC 25.5MC 26.5MC 27.75MC	2	See Instructions above	A1 thru A9	Observe pattern obtained to see that markers appear at proper points as per Fig. 3. Slight readjustments may be necessary to obtain the proper pattern.

SOUND IF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9	See Pre-alignment Instr.	High side thru input adapter to Point A. Low side to chassis.	21.75MC	2	Across capacitor C7	A10,A11	Adjust for maximum deflection.
10	"	"	"	"	DC Probe to Point B. Common to Point C.	A12	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. If A12 required much adjustment, A11 should be retouched for maximum.

TV OSCILLATOR ALIGNMENT

It is necessary that the sound IF system be accurately aligned before attempting alignment of the oscillator circuits.
Since small inductances are connected in series with the tuned circuits for channels 8, 10 & 12 to form the tuned circuits for channels 7, 9 & 11, the order of alignment is important. It is necessary to align the higher channel of each pair (7 & 8, 9 & 10, 11 & 12) first.
Insert V1 and V3 in the tuner which were removed for the video and sound IF alignment and set the fine tuning control to the midpoint of its rotation.
The coils slugs are held in place with wax which must be removed when aligning the individual coil and should be replaced after alignment is completed.

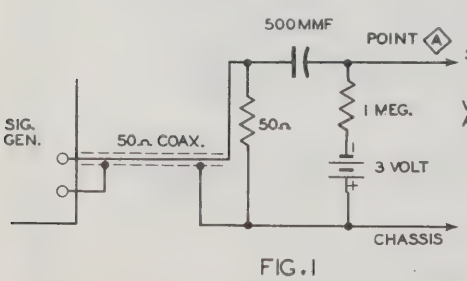


FIG. 1

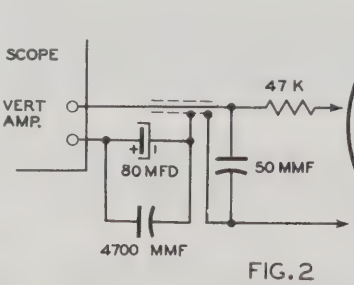


FIG. 2

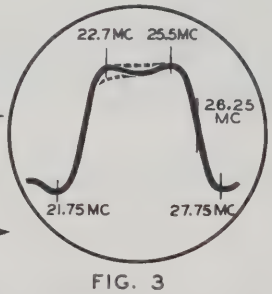


FIG. 3

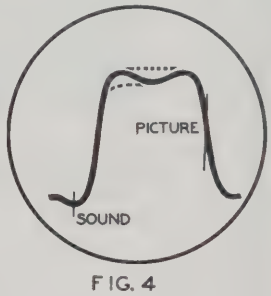


FIG. 4

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
11	Two125Ω carbon res.	Insert 125Ω resistor in each lead and connect to ant. terminals.	215.75MC	13	DC Probe to Point C. Common to Point B	A13	Adjust for zero reading.
12	"	"	209.75MC	12	"	A14	" " " "
13	"	"	203.75MC	11	"	A15	Mechanically distort coil position for zero reading.
14	"	"	197.75MC	10	"	A16	Adjust for zero reading.
15	"	"	191.75MC	9	"	A17	Mechanically distort coil position for zero reading.
16	"	"	185.75MC	8	"	A18	Adjust for zero reading.
17	"	"	179.75MC	7	"	A19	Mechanically distort coil position for zero reading.
18	"	"	87.75MC	6	"	A20	Adjust for zero reading.
19	"	"	81.75MC	5	"	A21	" " " "
20	"	"	71.75MC	4	"	A22	" " " "
21	"	"	65.75MC	3	"	A23	" " " "
22	"	"	59.75MC	2	"	A24	" " " "

TV RF & MIXER ALIGNMENT

In the event complete alignment of the RF Amp and Mixer circuits is necessary, it is recommed that the complete tuner be returned to the factory for a replacement unit. If only one or two channels require adjustments, alignment for those channels may be performed.

Short the AGC line to chassis while aligning the RF circuits.

Keep signal generator output as low as possible and still give reading

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
23	One 50Ω carbon res. & 2 125Ω carbon res.	Shunt generator with 50Ω resistor & insert 125Ω resistor in each lead. Connect across ant. terminal.	59.75MC	2	DC Probe to Point C Common to Point B		Adjust fine tuning control for zero reading.
24	"	"	"	2	Across cap. C7	A25	Adjust for maximum deflection.
25	"	"	65.75MC	3	DC Probe to Point C Common to Point B		Adjust fine tuning control for zero reading.
26	"	"	"	3	Across cap. C7	A26	Adjust for maximum deflection.
27	"	"	71.75MC	4	DC Probe to Point C Common to Point B		Adjust fine tuning control for zero reading.
28	"	"	"	4	Across cap. C7	A27	Adjust for maximum deflection.
29	"	"	81.75MC	5	DC Probeto Point C Common to Point B		Adjust fine tuning control for zero reading.
30	"	"	"	5	Across cap. C7	A28	Adjust for maximum deflection.
31	"	"	87.75MC	6	DC Probe to Point C Common to Point B		Adjust fine tuning control for zero reading.
32	"	"	"	6	Across cap. C7	A29	Adjust for maximum deflection.
33	"	"	55.25MC	2	Across Res. R43	A30	Adjust fine tuning control and A30 for maximum deflection.
34	"	"	61.25MC	3	"	A31	Adjust fine tuning control and A31 for maximum deflection.
35	"	"	67.25MC	4	"	A32	Adjust fine tuning control and A32 for maximum deflection.
36	"	"	77.25MC	5	"	A33	Adjust fine tuning control and A33 for maximum deflection.
37	"	"	83.25MC	6	"	A34	Adjust for fine tuning control and A34 for maximum deflection.
38	"	"	213MC	13	"	A35, A36	Adjust fine tuning control A35 and A36 for maximum deflection.
39	"	"	207MC	12	"	A37, A38	Adjust fine tuning control A37, and A38 for maximum deflection.
40	"	"	201MC	11	"	A39, A40	Adjust fine tuning control and mechanically distort A39 and A40 for maximum deflection.
41	"	"	195MC	10	"	A41, A42	Adjust fine tuning control A41 and A42 for maximum deflection.
42	"	"	189MC	9	"	A43, A44	Adjust fine tuning control and mechanically distort A43 and A44 for maximum deflection.
43	"	"	183MC	8	"	A45, A46	Adjust fine tuning control A45 and A46 for maximum deflection.
44	"	"	177MC	7	"	A47, A48	Adjust fine tuning control and mechanically distort A47 and A48 for maximum deflection.

TV ALIGNMENT INSTRUCTIONS (CONT.)

TV RF RESPONSE CHECK

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE & VTVM	ADJUST	REMARKS
45	One 50Ω carbon res. & two 125Ω carbon res.	Shunt generator with 50Ω resistor and insert 125Ω resistor in each lead Connect across ant. terminals.	Off	215.75MC	13	VTVM DC Probe to Point (C) Common lead to Point (B)		Adjust fine tuning control for zero reading.
46	"	"	213MC (10MC Sweep)	215.75MC and 211.25MC	13	Scope across R43 as per Fig 2.	A35, A36	If necessary, make slight adjustments to properly place markers as per Fig. 4.
47	"	"	Off	209.75MC	12	VTVM DC Probe to Point (C) Common to Point (B)		Adjust fine tuning control for zero reading.
48	"	"	207MC (10MC Sweep)	209.75MC and 205.25MC	12	Scope across R43 as per Fig 2.	A37, A38	If necessary, make slight adjustments to properly place markers as per Fig. 4.
49	"	"	Off	203.75MC	11	VTVM DC Probe to point (C) Common to Point (B)		Adjust fine tuning control for zero reading.
50	"	"	201MC (10MC Sweep)	203.75MC and 199.25MC	11	Scope across R43 as per Fig 2.	A39, A40	If necessary, mechanically distort the shape and position of coils A39, and A40 to properly place markers as per Fig 4.
51	"	"	Off	197.75MC	10	VTVM DC Probe to Point (C) Common to Point (B)		Adjust fine tuning control for zero reading.
52	"	"	195MC (10MC Sweep)	197.75MC and 193.25MC	10	Scope across R43 as per Fig 2.	A41, A42	If necessary, make slight adjustments to properly place markers as per Fig 4.
53	"	"	Off	191.75MC	9	VTVM DC Probe to Point (C) Common to Point (B)		Adjust fine tuning control for zero reading.
54	"	"	189MC (10MC Sweep)	191.75MC and 187.25MC	9	Scope across R43 as per Fig 2.	A43, A44	If necessary, mechanically distort the shape and position of coils A43, and A44 to properly place markers as per Fig 4.
55	"	"	Off	185.75MC	8	VTVM DC Probe to Point (C) Common to Point (B)		Adjust fine tuning control for zero reading.
56	"	"	183MC (10MC Sweep)	185.75MC and 181.25MC	8	Scope across R43 as per Fig 2.	A45, A46	If necessary, make slight adjustments to properly place markers as per Fig 4.
57	"	"	Off	179.75MC	7	VTVM DC Probe to Point (C) Common to Point (B)		Adjust fine tuning control for zero reading.
58	"	"	177MC (10MC Sweep)	179.75MC and 175.25MC	7	Scope across R43 as per Fig 2.	A47, A48	If necessary, mechanically distort the shape and position of coils A47 and A48 to properly place markers as per Fig 4.
59	"	"	Off	87.75MC	6	VTVM DC Probe to Point (C) Common to Point (B)		Adjust fine tuning control for zero reading.
60	"	"	85MC (10MC Sweep)	87.75MC and 83.25MC	6	Scope across R43 as per Fig 2.	A29, A34	If necessary, make slight adjustments to properly place markers as per Fig 4.
61	"	"	Off	81.75MC	5	VTVM DC Probe to Point (C) Common to Point (B)		Adjust fine tuning control for zero reading.
62	"	"	79MC (10MC Sweep)	81.75MC and 77.25MC	5	Scope across R43 as per Fig 2	A28, A33	If necessary, make slight adjustments to properly place markers as per Fig 4.
63	"	"	Off	71.75MC	4	VTVM DC Probe to Point (C) Common to Point (B)		Adjust fine tuning control for zero reading.
64	"	"	69MC (10MC Sweep)	71.75MC and 67.25MC	4	Scope across R43 as per Fig 2.	A27, A32	If necessary, make slight adjustments to properly place markers as per Fig 4.
65	"	"	Off	65.75MC	3	VTVM DC Probe to Point (C) Common to Point (B)		Adjust fine tuning control for zero reading.
66	"	"	63MC (10MC Sweep)	65.75MC and 61.25MC	3	Scope across R43 as per Fig 2.	A26, A31	If necessary, make slight adjustments to properly place markers as per Fig 4.
67	"	"	Off	59.75MC	2	VTVM DC Probe to Point (C) Common to Point (B)		Adjust fine tuning control for zero reading.
68	"	"	57MC (10MC Sweep)	59.75MC and 55.25MC	2	Scope across R43 as per Fig 2.	A25, A30	If necessary, make slight adjustments to properly place markers as per Fig 4.

AM FM ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low frequency end of dial.

Use insulated alignment screwdriver for adjusting.

Dummy antenna consists of a 200MMFD cap. in series with a 20millihenry choke, the choke being shunted by a 400MMFD cap in series with a 100Ω carbon resistor.

AM ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
70.	.02MFD	High side to pin 7 (Grid) of 6BE6 (V29). Low side to chassis.	456KC	AM (center position)	Tuning cap fully open	Across voice coil	A49, A50, A51, A52	Adjust for maximum output.
71.	Dummy Ant.	High side to green antenna lead. Low side to chassis.	1500KC	"	1500KC	"	A53	" " " "
72.	Dummy Ant.	"	"	"	Tune for maximum output.	"	A54, A55	" " " "
73.	Dummy Ant.	"	600KC	"	"	"	A56	Rock tuning cap and adjust for maximum output. Repeat steps 71, 72, & 73 until no further improvement can be made.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep.

Connect the synchronized sweep voltage from the signal generator to the horizontal input of scope. This voltage may be taken from the powerline if signal generator does not have a sync. voltage output. There may be some phase shift encountered between signal generator and scope horizontal sweep. If provision is made for this in the scope, rotate phase control until a single trace pattern is obtained. If no provision in made for this, the same thing may be accomplished by inserting a cap. of suitable value (.01 to .1MFD) in series with the horizontal sync. input.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	SCOPE CONNECT	ADJUST	REMARKS
74.	.01MFD	High side to pin 6 (Grid) of 7A7 1st IF tube (V30) Low side to chassis.	10.7MC (freq. mod.)	FM (counter clock-wise)	Tuning cap fully open	Vertical input to point D. Ground to chassis.	A57, A58, A59, A60	Disconnect 3MFD cap (C9) from point D. Adjust A57 thru A60 for maximum amplitude and symmetry of pattern per Fig 5.
75.	.01MFD	High side to pin 7 (Grid) of 6BE6 (V29). Low side to chassis.	"	"	"	"	A61, A62	Adjust for maximum amplitude and symmetry of pattern per Fig 5. Reconnect cap (C9) to Point D.
76.	.01MFD	"	"	"	"	Vertical input to Point E. Ground to chassis.	A63	Adjust for maximum straightness of diagonal line with center of diagonal line on scope horizontal sweep line per Fig 6. Continue with FM-RF Alignment in step 79.

FIG. 5

FIG. 6

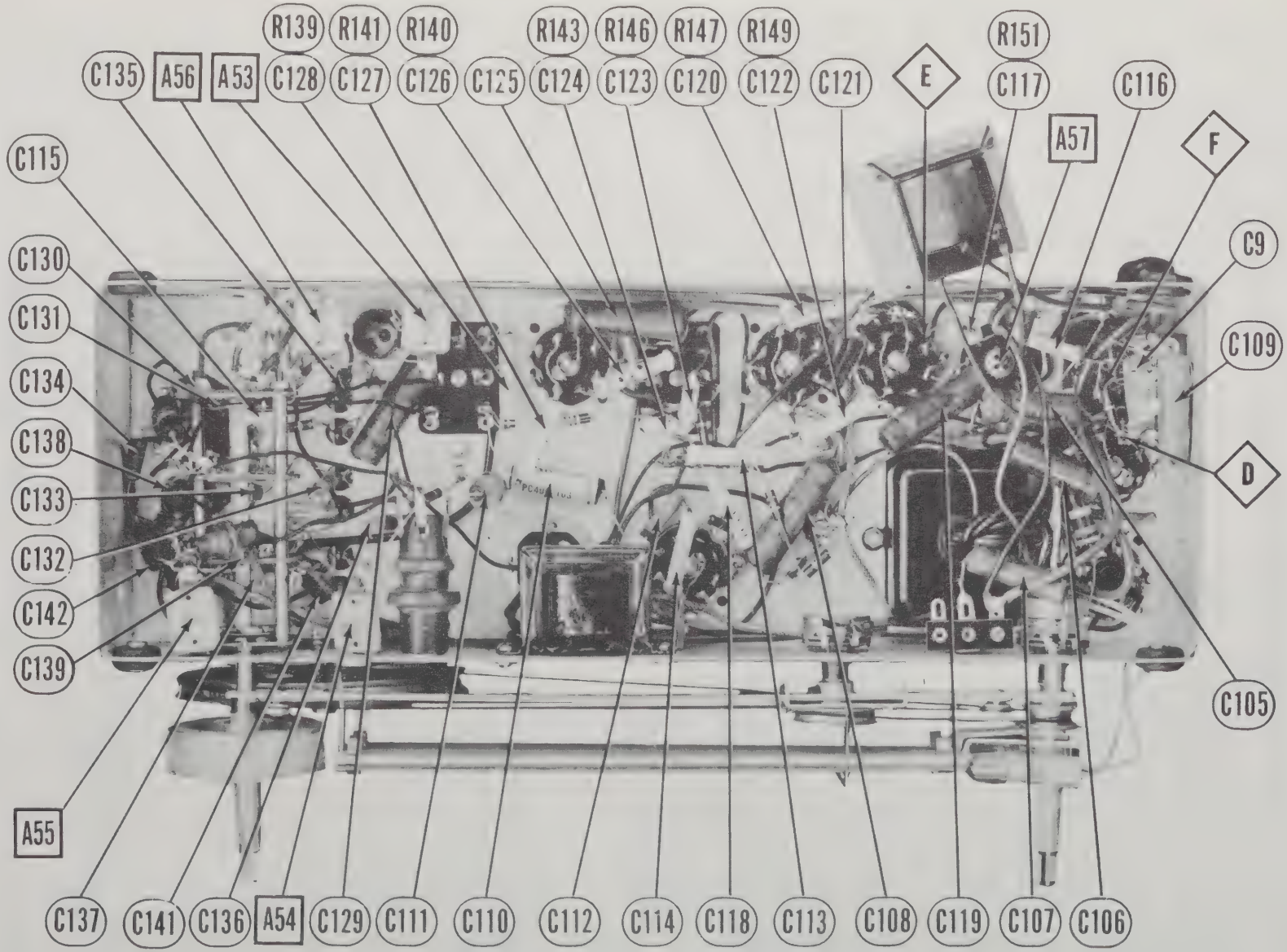
FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND OUTPUT METER

Use low range output meter and attenuate output of signal generator to maintain approximately maximum reading on meter.

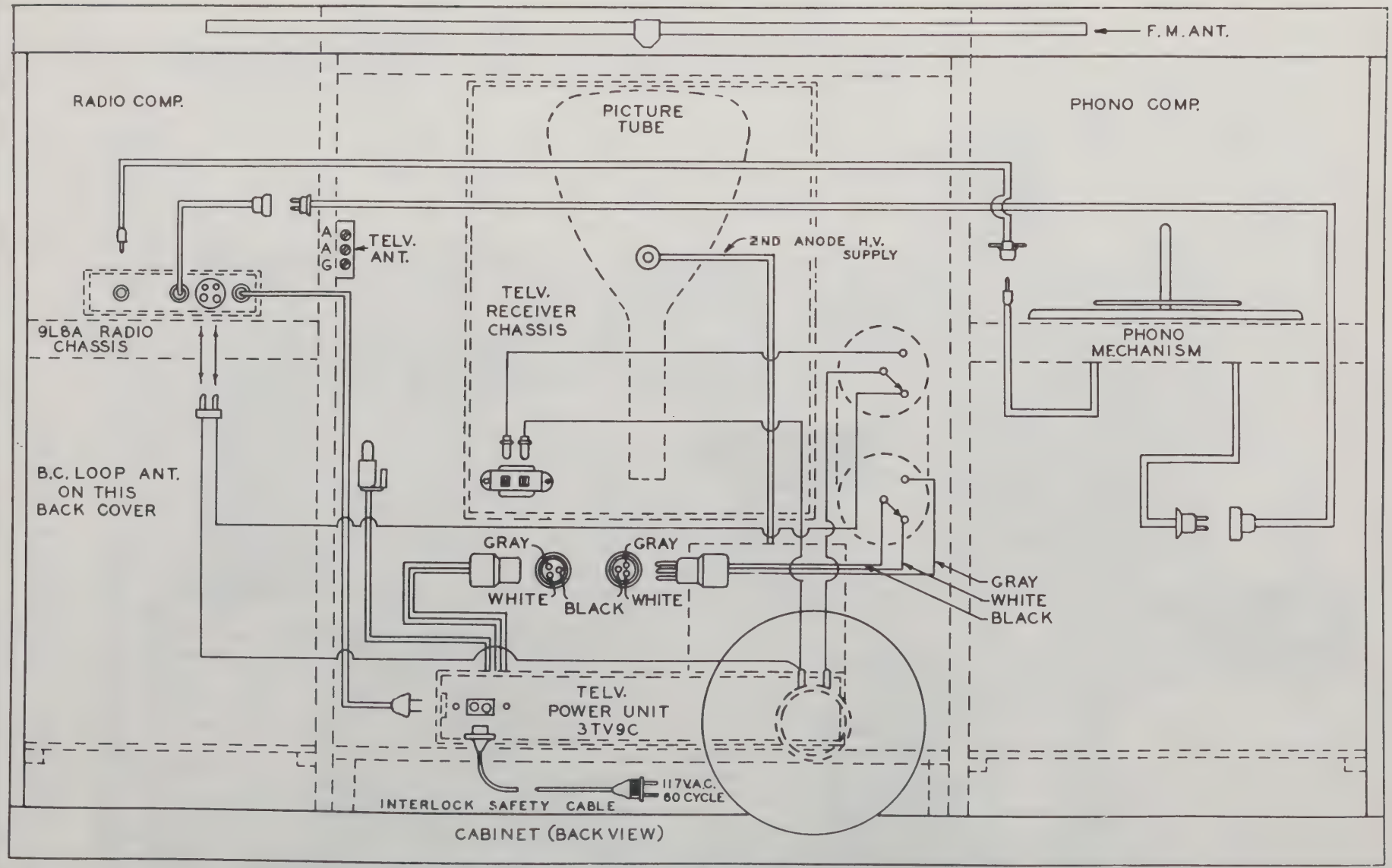
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
74.	.05MFD	High side to pin 6 (Grid) of 7AG7 FM driver (V32). Low side to chassis.	10.7MC (400~ AM Mod.)	FM (counter clock-wise)	Tuning cap fully open	Across voice coil	A57, A63	Adjust for maximum output.
75.	.05MFD	High side to pin 6 (Grid) of 7AG7 2nd IF tube (V31) Low side to chassis.	"	"	"	"	A58	" " " "
76.	.05MFD	High side to pin 6 (Grid) of 7A7 1st IF tube (V30) Low side to chassis.	"	"	"	"	A59, A60	" " " "
77.	.05MFD	High side to pin 7 (Grid) of 6BE6 (V29). Low side to chassis.	"	"	"	"	A61, A62	Shunt 15KΩ carbon resistor from pin 6 (Grid) of 7A7 to chassis. Adjust A61 and A62 for maximum output. Remove 15KΩ resistor.
78.	.05MFD	"	"	"	"	"	A63	Adjust for minimum output. Continue with FM-RF Alignment in step 79.

FM RF ALIGNMENT

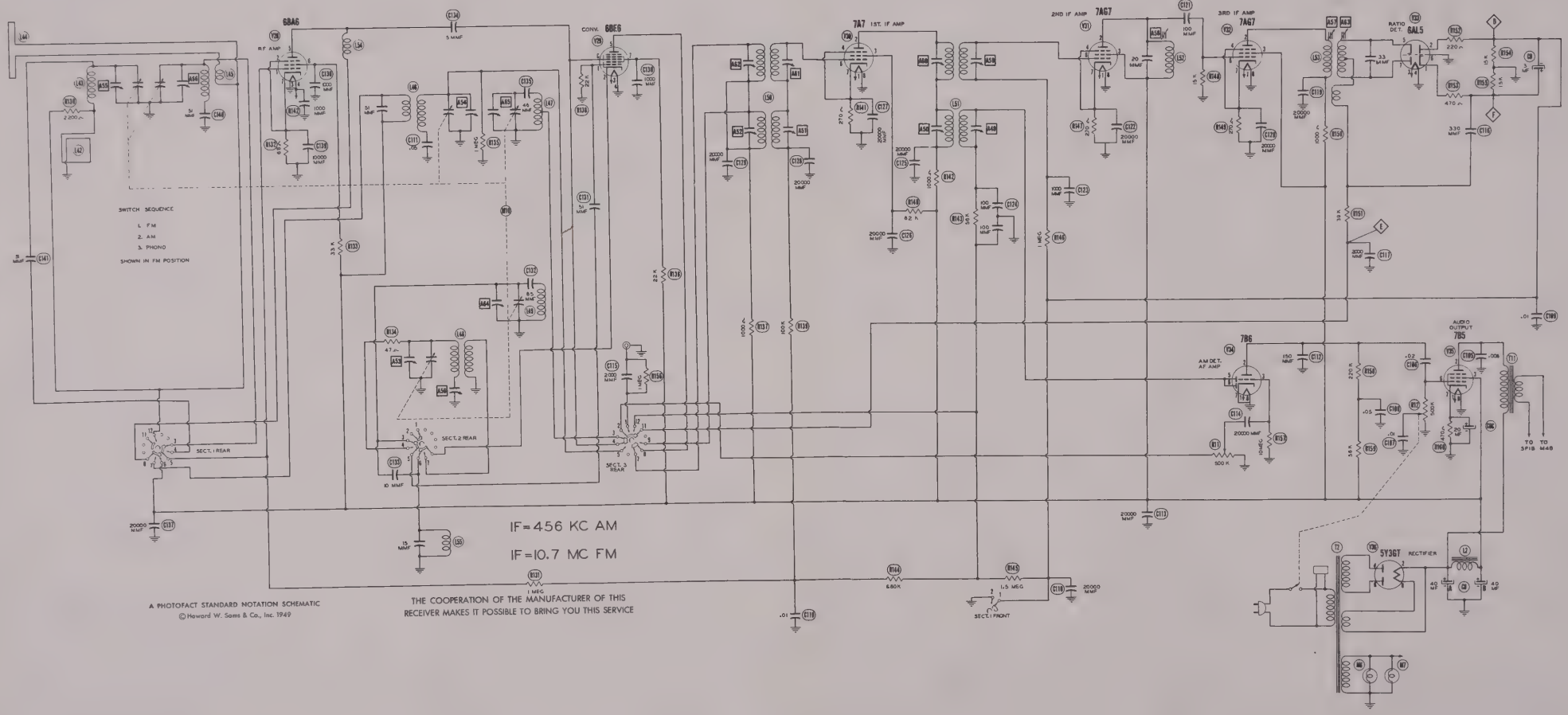
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
79.	300Ω carbon res.	Each side to FM Antenna terminal	108MC (Unmod.)	FM	108MC	DC Probe to Point D. Common to Point F.	A64	Adjust for maximum deflection.
80.	300Ω carbon res.	"	"	"	Tune for maximum deflection	"	A65, A66	Rock tuning cap and adjust for maximum deflection. Check calibration at 88MC.



AM-FM CHASSIS-BOTTOM VIEW



CABLE CONNECTIONS - MODEL 4900 TV



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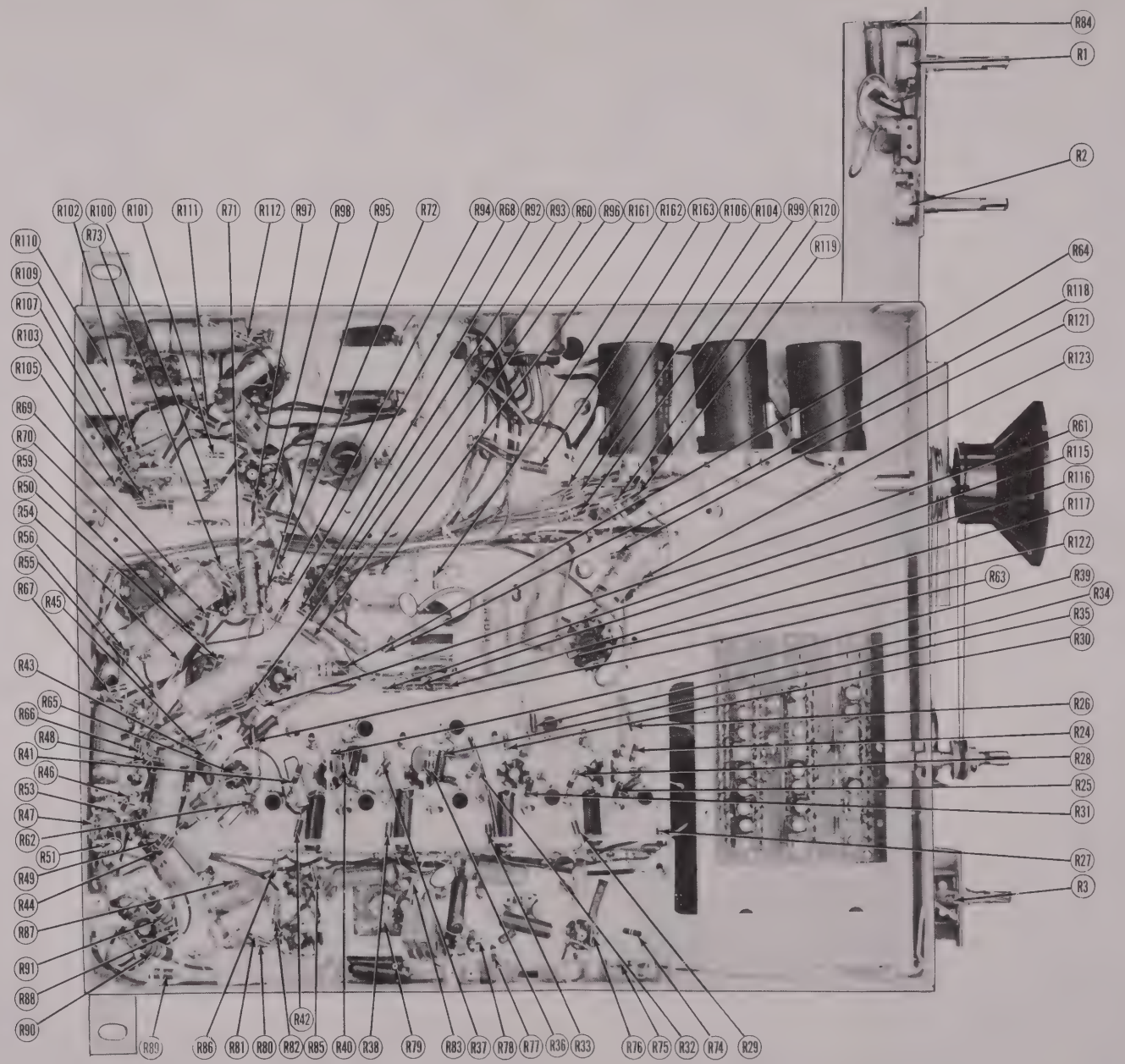
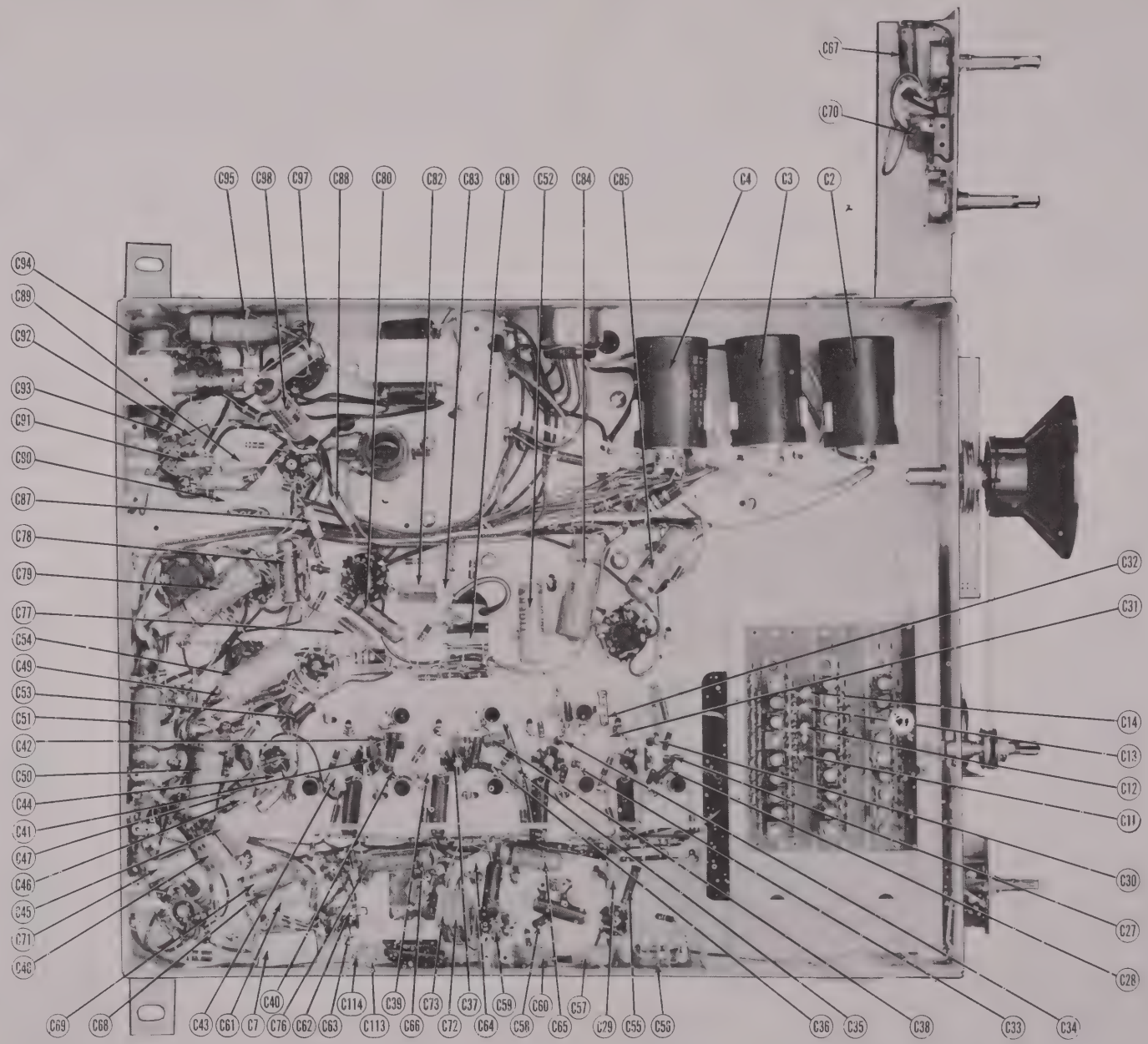


CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BH6	-.3VDC	.7VDC	0V	6.3VAC	130VDC	130VDC	0V		
V 2	6AG5	-1.3VDC	0V	0V	6.3VAC	160VDC	72VDC	0V		
V 3	6C4	140VDC	0V	6.3VAC	0V	140VDC	§-4.7VDC	0V		
V 4	6BH6	0V	.7VDC	0V	6.3VAC	150VDC	120VDC	0V		
V 5	6BH6	0V	.7VDC	0V	6.3VAC	145VDC	115VDC	0V		
V 6	6BH6	0V	.8VDC	0V	6.3VAC	145VDC	110VDC	0V		
V 7	6BH6	0V	.8VDC	0V	6.3VAC	150VDC	115VDC	0V		
V 8	6AL5	-1VDC	†.8VDC	0V	6.3VAC	†2.8VDC	0V	0V		
V 9	6AU6	†.7VDC	†.8VDC	** 6.3VAC	** 6.3VAC	†300VDC	†125VDC	†3.2VDC		
V 10	6AK6	†.2VDC	†.8VDC	** 6.3VAC	** 6.3VAC	†250VDC	†160VDC	†9.5VDC		
V 11	6AL5	0V	†0V	6.3VAC	0V	†1.6VDC	0V	0V		
V 12	6AU6	†1VDC	†.8VDC	** 6.3VAC	** 6.3VAC	†155VDC	0V	†3.2VDC		
V 13	6AU6	†.1VDC	†0V	** 6.3VAC	** 6.3VAC	†150VDC	0V	†1VDC		
V 14	6AU6	†-.1VDC	†0V	** 6.3VAC	** 6.3VAC	†150VDC	0V	†.5VDC		
V 15	6AL5	†-.7VDC	†-.5VDC	** 6.3VAC	** 6.3VAC	†0V	†0V	†-.8VDC		
V 16	6AT6	†-.5VDC	†0V	** 6.3VAC	** 6.3VAC	†0V	†0V	†95VDC		
V 17	6V6GT	0V	** 6.3VAC	†215VDC	†225VDC	†0V	†260VDC	** 6.3VAC	†12VDC	
V 18	6J6	80VDC	29VDC	6.3VAC	0V	-.2VDC	-.6VDC	0V		
V 19	6SN7GT	† -20VDC	†85VDC	†0V	†0V	†250VDC	†10VDC	** 6.3VAC	** 6.3VAC	
V 20	6V6GT	0V	** 6.3VAC	†140VDC	†140VDC	†-.8VDC	†0V	** 6.3VAC	†5.4VDC †28VDC	
V 21	6AL5	†0V	†0V	** 6.3VAC	** 6.3VAC	†1VDC	†0V	†-1.2VDC		
V 22	12AU7	†50VDC	†-4VDC ‡-7.4VDC	† 4VDC	** 6.3VAC	** 6.3VAC	†95VDC	†0V	†4VDC	** 6.3VAC
V 23	6L6G	†0V	** 6.3VAC	†290VDC	†275VDC	†0V	0V	** 6.3VAC	†14VDC	
V 24	5V4G	0V	140VDC	0V	-.8VDC	0V	-.8VDC	0V	140VDC	
V 25	6SN7GT	†-35VDC	300VDC	14VDC	†-35VDC	300VDC	14VDC	** 6.3VAC	** 6.3VAC	
V 26	1B3GT									
V 27	5U4G	0V	180VDC	0V	350VAC	0V	350VAC	0V	180VDC	
V 28	6BA6	-.1VDC	.9VDC	6.4VAC	0V	240VDC	100VDC	-.1VDC		
V29A	6BE6	§-4.2VDC	0V	6.4VAC	0V	230VDC	90VDC	-.1VDC		
‡ V29B	6BE6	§-3.6VDC	0V	6.4VAC	0V	230VDC	90VDC	0V		
V30	7A7	6.4VAC	230VDC	80VDC	2VDC	0V	-.1VDC	2VDC	0V	
V31	7AG7	6.4VAC	240VDC	240VDC	.7VDC	0V	-.1VDC	.7VDC	0V	
‡ V32	7AG7	6.4VAC	240VDC	240VDC	1.5VDC	0V	0V	1.5VDC	0V	
V33	6AL5	2.6VDC	-2.9VDC	0V	6.4VAC	-.6VDC	0V	1.9VDC		
V34	7B6	6.4VAC	90VDC	†-.6VDC	0V	0V	-.7VDC	0V	6.4VAC	
V35	7B5	0V	255VDC	240VDC	0V	0V	0V	16VDC	6.4VAC	
V36	5Y3GT	0V	270VDC	0V	250VAC	0V	250VAC	0V	270VDC	
V37	10BP4	0V	†1.8VDC	PIN 10 †320VDC	PIN 11 †120VDC	PIN 12 6.3VAC				

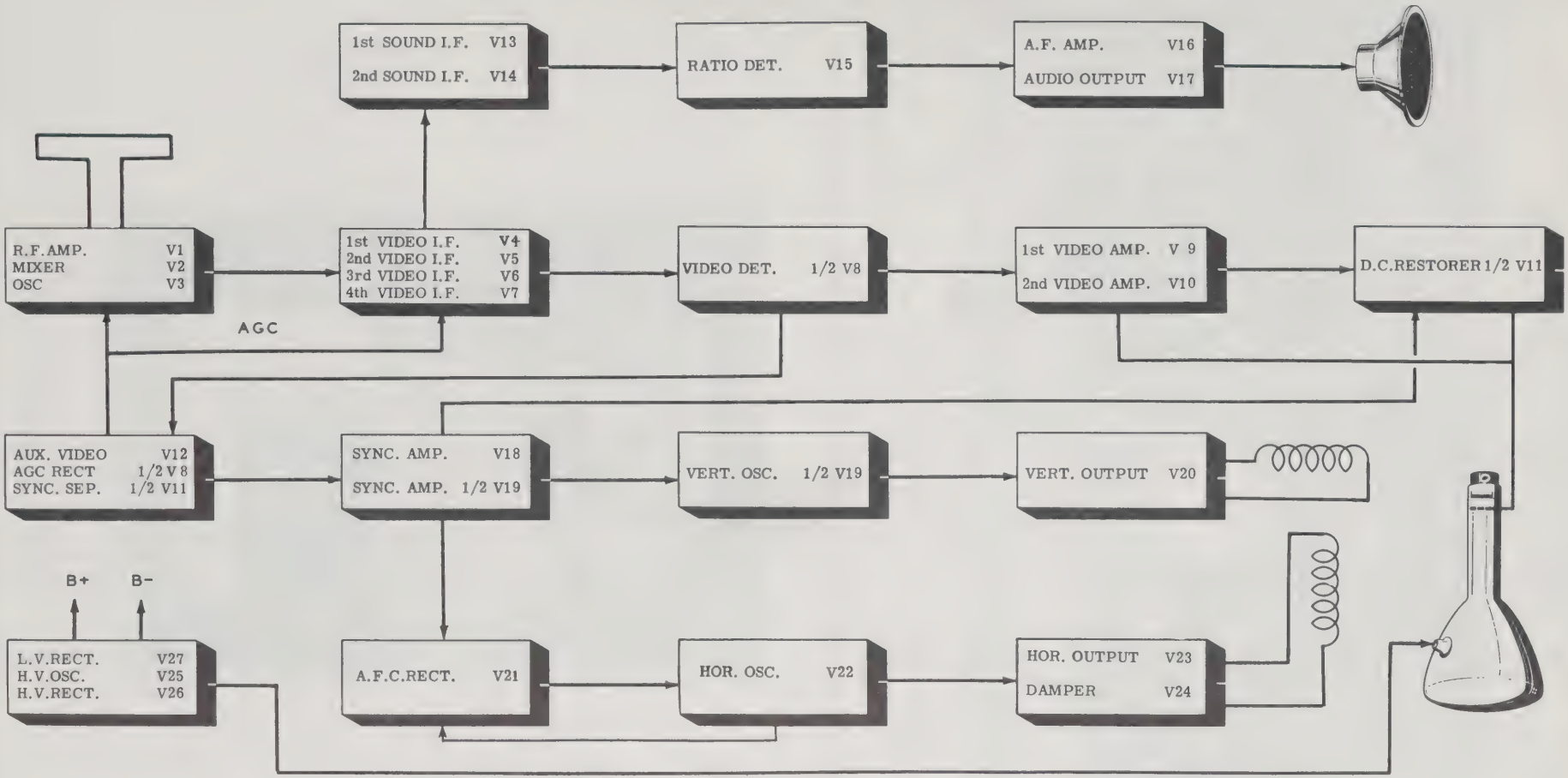
† Measured from pin 3 of V19
‡ Taken in FM position
** 6.3VAC measured between filaments
§ Taken with vacuum tube voltmeter

RESISTANCE READINGS

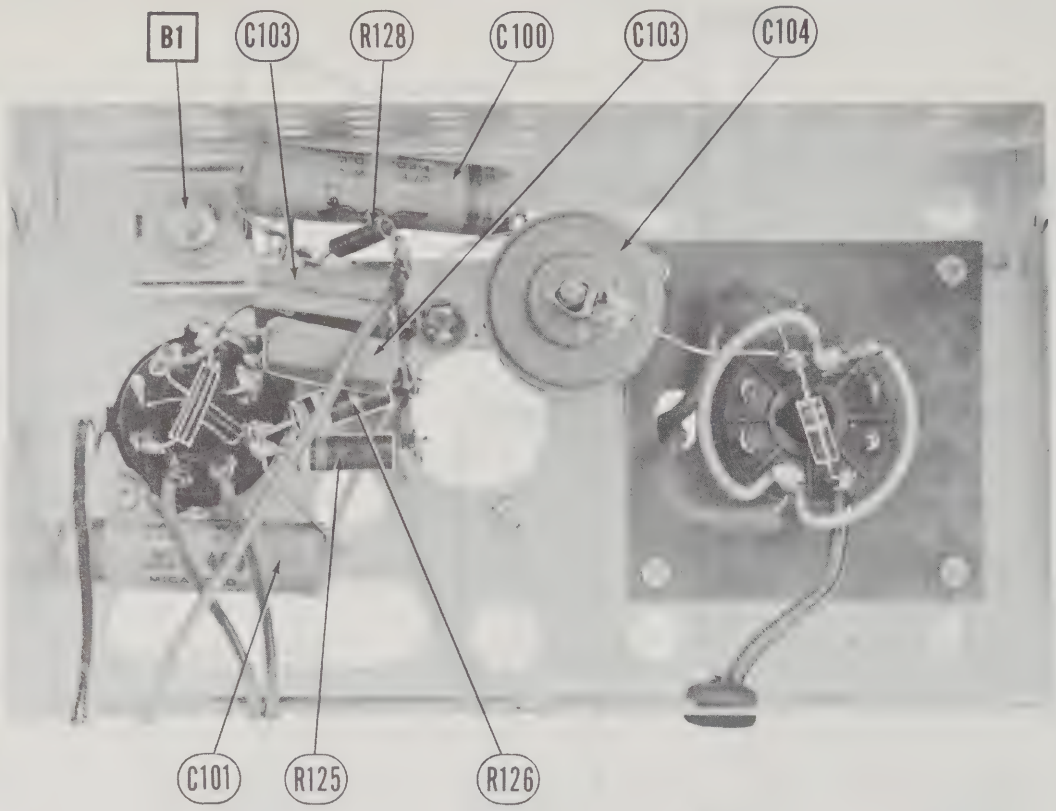
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BH6	3 Meg.	100Ω	0Ω	.2Ω	*2.2KΩ	*15KΩ	0Ω		
V 2	6AG5	1 Meg.	0Ω	0Ω	.2Ω	*1500Ω	*56KΩ	0Ω		
V 3	6C4	*580Ω	Inf.	.2Ω	0Ω	*580Ω	18KΩ	0Ω		
V 4	6BH6	3 Meg.	100Ω	0Ω	.2Ω	*1500Ω	*17KΩ	0Ω		
V 5	6BH6	3 Meg.	100Ω	0Ω	.2Ω	*1500Ω	*17KΩ	0Ω		
V 6	6BH6	1.6Ω	100Ω	0Ω	.2Ω	*1500Ω	*17KΩ	0Ω		
V 7	6BH6	1.6Ω	100Ω	0Ω	.2Ω	*1500Ω	*17KΩ	0Ω		
V 8	6AL5	8KΩ	†200Ω	0Ω	.2Ω	†3.3KΩ	0Ω	1 Meg.		
V 9	6AU6	†3.3KΩ	†47Ω	8KΩ	8KΩ	*1800Ω	68KΩ	†1500Ω		
V 10	6AK6	†470KΩ	†47Ω	8KΩ	8KΩ	*6.8KΩ	*100KΩ	†820Ω		
V 11	6AL5	220KΩ	†4.7KΩ	.2Ω	0Ω	†1.5Meg.	0Ω	10KΩ		
V 12	6AU6	†3.3KΩ	†47Ω	8KΩ	8KΩ	*10KΩ	0Ω	†470Ω		
V 13	6AU6	400KΩ	†.4Ω	8KΩ	8KΩ	.1Ω	0Ω	†82Ω		
V 14	6AU6	100KΩ	†.2Ω	8KΩ	8KΩ	.1Ω	0Ω	†65Ω		
V 15	6AL5	Inf.	Inf.	8KΩ	8KΩ	8KΩ	8KΩ	†20KΩ		
V 16	6AT6	† 10 Meg.	†0Ω	8KΩ	8KΩ	†220KΩ	†220KΩ	*270KΩ		
V 17	6V6GT	0Ω	8KΩ	*2300Ω	*2500Ω	†450KΩ	7KΩ	8KΩ	†390Ω	
V 18	6J6	*28KΩ	*60KΩ	.2Ω	0Ω	10KΩ	1 Meg.	0Ω		
V 19	6SN7GT	† 1 Meg	*360KΩ	†0Ω	†1500Ω	*12KΩ	†2.2KΩ	8KΩ	8KΩ	
V 20	6V6GT	0Ω	8KΩ	*13KΩ	*13KΩ	†3.3Meg.	†0Ω	8KΩ	15KΩ †400Ω	
V 21	6AL5	Inf.	Inf.	8KΩ	8KΩ	†100KΩ	0Ω	†100KΩ		
V 22	12AU7	*350KΩ	1 Meg. 580KΩ	1000Ω	8KΩ	8KΩ	*60KΩ	Inf.	†1000Ω	8KΩ
V 23	6L6G	0Ω	8KΩ	*5.5KΩ *500Ω	*4.7KΩ	†470KΩ	Inf.	8KΩ	†180Ω	
V 24	5V4G	Inf.	*500Ω	Inf.	16Ω	68Ω	16Ω	Inf.	*500Ω	
V 25	6SN7GT	†3.9KΩ	*450Ω	†470Ω	†3.9KΩ	*450Ω	†470Ω	8KΩ	8KΩ	
V 26	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP *1000Ω
V 27	5U4G	Inf.	3.5KΩ	Inf.	8KΩ	Inf.	8KΩ	Inf.	3.5KΩ	
V 28	6BA6	2.1Meg.	68Ω	.1Ω	0Ω	** 120Ω	** 33KΩ	68Ω		
V29A	6BE6	22KΩ	1Ω	.1Ω	0Ω	** 1000Ω	** 22KΩ .	1 Meg.		
V29B	6BE6	22KΩ	0Ω	.1Ω	0Ω	** 1000Ω	** 22KΩ	1 Meg.		
V30	7A7	.1Ω	** 1000Ω	** 82KΩ	270Ω	0Ω	1.2 Meg.	270Ω	0Ω	
V31	7AG7	.1Ω	**60Ω	**60Ω	270Ω	0Ω	1 Meg.	270Ω	0Ω	
V32	7AG7	.1Ω	** 1000Ω	**60Ω	270Ω	0Ω	15KΩ	270Ω	0Ω	
V33	6AL5	16KΩ	15KΩ	0Ω	.1Ω	540KΩ	0Ω	540KΩ		
V34	7B6	.1Ω	**270KΩ	10 Meg.	Inf.	Inf.	500KΩ	0Ω	.1Ω	
V35	7B5	0Ω	**425Ω	**60Ω	Inf.	Inf.	500KΩ	470Ω	.1Ω	
V36	5Y3GT	0Ω	110KΩ	Inf.	65Ω	Inf.	70Ω	Inf.	110KΩ	
V37	10BP4	0Ω	*1.5 Meg.	PIN 10 *65Ω	PIN 11 *22KΩ	PIN 12 .2Ω				

** Measured from pin 2 of V36
‡ Taken in FM position
† Meaured from pin 3 of V19
* Measured from pin 2 of V27

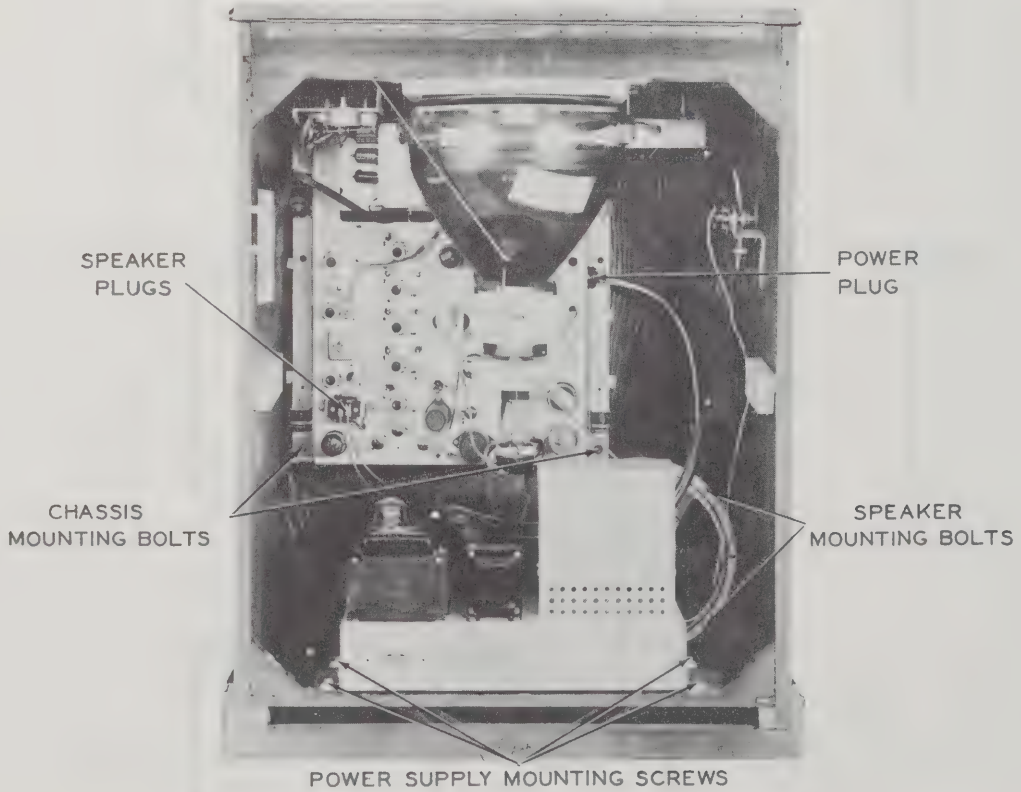
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



BLOCK DIAGRAM

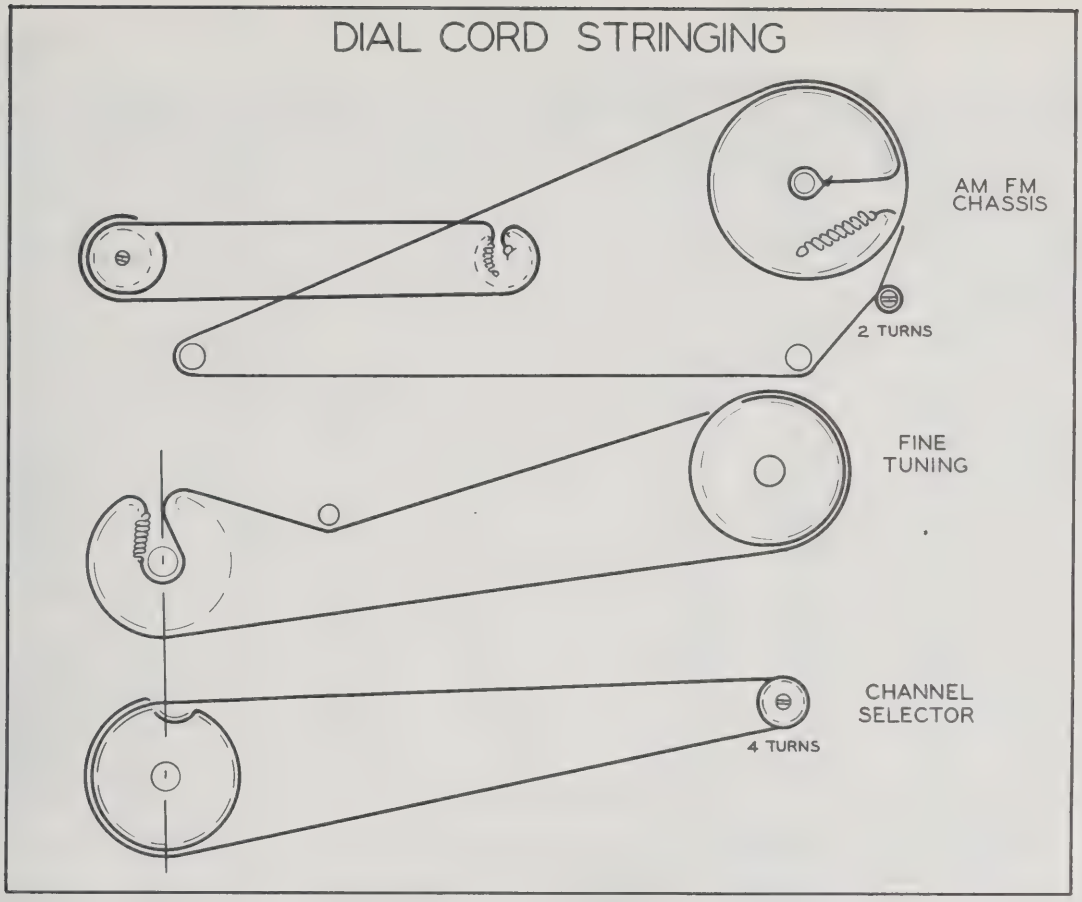


HIGH VOLTAGE SUPPLY-BOTTOM VIEW



CABINET-REAR VIEW

DIAL CORD STRINGING



DISASSEMBLY INSTRUCTIONS

MODEL 4900TV

1. Remove five push-on type control knobs.
2. Remove back cover from center compartment.
3. Remove speaker wires from transformer.
4. Remove HV lead from picture tube.
5. Remove power plug from TV chassis.
6. Disconnect AC plug to switch on door.
7. Remove radio AC plug from power supply.
8. Remove pilot light from mounting bracket.
9. Disconnect antenna lead at cabinet.
10. Remove four hex head screws holding power supply chassis. Remove power supply.
11. Lay cabinet front down on floor. CAUTION: The radio panel and phono unit must either be fastened or held while tipping cabinet.
12. Remove two hex head screws from bottom of chassis.
13. Slide chassis far enough back to unhook holding lugs then lift chassis straight up out of cabinet.

MODELS 4939TV, 4940TV, 4941TV.

1. Remove five push-on type control knobs.
2. Remove twelve phillips head wood screws and two 1/4" hex-head self tapping screws holding back cover. Remove cover.
3. Disconnect power switch plug. And remove power plug from TV chassis, HV plug from picture tube, and remove cabinet light.
4. Remove four 3/8" hex head metal screws holding power supply chassis. Remove power supply chassis.
5. Remove power switch lever. Remove hex head nut holding power switch. Remove power switch.
6. Remove isolation lead from door hinge.
7. Remove speaker wires from output transformer.
8. Remove four 3/8" hex nuts holding speaker. Remove speaker.
9. Lay cabinet down on front.
10. Remove two phillips head wood screws holding antenna mounting strip. Remove strip.
11. Remove two 3/8" hex head metal bolts from bottom of chassis. Slide chassis back to unhook holding lugs then remove by lifting straight up.

HIGH VOLTAGE RF OSCILLATOR ADJUSTMENT

The high voltage output may be varied by adjustment of trimmer B1 which is located in the high voltage compartment.

This trimmer is adjusted for approximately 10KV on the high capacity side of the high voltage peak.

This setting gives maximum efficiency and regulation.

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SPARTON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.	6BH6	6BH6	7CM	
V2	Mixer	6AQ5	6AQ5	7BC	
V3	RF Osc.	6C4	6C4	6BG	
V4	1st Video IF	6BH6	6BH6	7CM	
V5	2nd Video IF	6BH6	6BH6	7CM	
V6	3rd Video IF	6BH6	6BH6	7CM	
V7	4th Video IF	6BH6	6BH6	7CM	
V8	Video DET-AGC Rect.	6AL5	6AL5	6BT	
V9	1st Video Amp.	6AU6	6AU6	7BK	
V10	2nd Video Amp.	6AK6	6AK6	7BK	
V11	DC Restorer-Sync. Sep.	6AL5	6AL5	6BT	
V12	Aux. Video	6AU6	6AU6	7BK	
V13	1st Sound IF	6AU6	6AU6	7BK	
V14	2nd Sound IF	6AM6	6AM6	7BK	
V15	Ratio Detector	6AL5	6AL5	6BT	
V16	VF Amp.	6AT6	6AT6	7AT	
V17	Audio Output	6V6GT	6V6GT	7AC	
V18	Sync. Amp.	6J6	6J6	7BF	
V19	Sync. Amp.-Vert. Osc.	6SN7GT	6SN7GT	6BD	
V20	Vert. Output	6V6GT	6V6GT	7AC	
V21	AFC Rectifier	6AL5	6AL5	6BT	
V22	Horiz. Osc.	12AU7	12AU7	9A	
V23	Horiz. Output	6L6G	6L6G	7AC	
V24	Damper	5V4G	5V4G	5L	
V25	HV Osc.	6SN7GT	6SN7GT	6BD	
V26	HV Rectifier	1B3GT	1B3GT	3C	
V27	LV Rectifier	5U4G	5U4G	5T	
V28	RF Amp.	6BA6	6BA6	7BK	
V29	Converter	6BE6	6BE6	7CH	
V30	1st IF Amp.	7A7	7A7	8V	
V31	2nd and 3rd IF Amp.	7AG7	7AG7	8V	
V32	4th IF Amp.	7AG7	7AG7	8V	
V33	Ratio Det.	6AL5	6AL5	6BT	
V34	DET.-AVC-AF	7B6	7B6	8M	
V35	Power Output	7B5	7B5	8AE	
V36	Rectifier	5Y3GT	5Y3GT	5T	
V37	Picture Tube	10BP4	10BP4		

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SPARTON PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450	PA4304-3	AFH86J	UF4445			TVL-64	▲ Filter
B	40	450							▲ Filter
C2	80	300	PA4309-1	AF86J	UP7AJ 1060			TVL-5	Filter
C3	80	300	PA4309-1	AF86J	UP7AJ 1060			TVL-5	Filter
C4A	15	350	PA4307-6	AF444J	UP7DJ				Decoupling
B	15	350		PRS150/50	1044				Sync. Amp. Plate Decoup. Decoupling
C	15	350							Vert. Output Cath. Byp.
D	50	50							Vert. Output Cath. Byp.
C5A	10	450	PA4300-10	AF22J4A	UP1145 C			TVL-52	1st Video Amp. Screen Byp.
B	10	450							2nd Video Amp. Screen Byp.
C	20	25							2nd Video Amp. Cath. Byp.
C6A	15	350	PA4307-6	AF444J	UP7DJ				Sync. Amp. Decoup.
B	15	350		PRS150/50	1044				Sound Output Decoup.
C	15	350							Brightness Cont. Bypass
D	50	50							Sound Output Cath. Bypass
C7	5	50	PA4303-12	PRS150/4	BR550		M-74-4-50	TVA-13	Stabilizing Cap.
C8A	40	400	PA4307-3	AF86J4A	UP4445 C		DY-314	TVL-54	▲ Filter ■ Filter ▲ Output Cath. Bypass
B	40	400							
C	20	25							
C9	3	50	PA4308-1	PRS150/4	BR415		M-4-150	TVA-13	Stabilizing Cap. Decoupling
C10	15	450	PA4309-2			GP1K-15			RF Coupling
C11	15					JP1K-15			" "
C12	15					GP1K-15			" "
C13	15					GP1K-15			" "
C14	15					GP1K-15			" "
C15	47					GP2K-50			AFC Filter
C16	470					GP2K-500			RF Screen Bypass
C17	470					GP2K-500			RF Bypass
C18	470					GP2K-500			RF Coupling
C19	47					GP1K-50			Osc. Coupling
C20	1.5					NP0K-1.5			Mixer Screen Bypass
C21	470					GP2K-500			Fixed Trimmer
C22	100								Osc. Feedback
C23	10					GP1K-10			Osc. Grid Cap.
C24	10					GP1K-10			Mixer Fil. Bypass
C25	470					GP2K-500			Osc. Fil. Bypass
C26	470					GP2K-500			
C27	270		HX36M-271	1468-00025	5W5T2S	GP2K-250	MO.5-325	1FM-325	IF Coupling
C28	1000		HX36H-102	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	Mixer Decoupling
C29	4700	500	MC61F-472	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	RF Bypass
C30	1000		HX36H-102	1468-001	1D5D1	GP2L-001	MW.5-21	1FM-21	AGC Filter
C31A	1000		PA4329-2	1468-001	1D5D1	GP2L-001	MW.5-21	1FM-21	1st IF Screen Bypass
B	1000			1468-001	1D5D1	GP2L-001	MW.5-21	1FM-21	1st IF Fil. Bypass
C	1000			1468-001	1D5D1	GP2L-001	MW.5-21	1FM-21	1st IF Decoupling
C32	100		CC30A-101F	1468-0001	5R5T1	NP0M-100	MO5.5-31	1FM-31	Fixed Trimmer
C33	270		HX36M-271	1468-00025	5W5T2S	GP2K-250	MO.5-325	1FM-325	IF Coupling
C34	1000		HX36H-102	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	AGC Filter
C35A	1000		PA4329-2	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	2nd IF Screen Bypass
B	1000			1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	2nd IF Fil. Bypass
C	1000			1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	2nd IF Decoupling
C36	270		HX36M-271	1468-00025	5W5T2S	GP2K-250	MO.5-325	1FM-325	IF Coupling
C37	5000		PA4334-1	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	3rd IF Cath. Bypass
C38	470	500	MC61E-471			GP2K-500			Fixed Trimmer
C39A	1000		PA4329-2	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	3rd IF Screen Bypass
B	1000			1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	3rd IF Fil. Bypass
C	1000			1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	3rd IF Decoupling
C40	270		HX36M-271	1468-00025	5W5T2S	GP2K-250	MO.5-325	1FM-325	IF Coupling
C41	5000		PA4334-1	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	4th IF Cath. Bypass
C42	470	500	MC60E-471			GP2K-500			Fixed Trimmer
C43A	1000		PA4329-2	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	4th IF Screen Bypass
B	1000			1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	4th IF Fil. Bypass
C	1000			1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	4th IF Decoupling
C44	22		CC30A-220K		5W5Q2	GP1K-25	MO5.5-42	MS-42	IF Coupling
C45	4700	500	MC61F-472	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	RF Bypass
C46	4.7		PA4328-11	1468-000005	5W5V5	NP0K-5	MO.5-55	MS-55	" "
C47	4.7		PA4328-11	1468-000005	5W5V5	NP0K-5	MO.5-55	MS-55	" "
C48	4700		MC61F-472	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	" "
C49	10		CC30A-100F	1468-00001	5W5Q1	GP1K-10	MO.5-41	MS-41	1st Video Amp. Cath. Byp
C50	.1	400		P488-1	GT4P1		ST-4-1	TM-1	Video Coupling
C51	.1	400		P488-1	GT4P1		ST-4-1	TM-1	" "
C52	.1	200		P288-1	GT2P1		ST-2-1	TM-1	AGC Filter
C53	100		CC32A-101A	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Bypass
C54	.25	200		P488-25	GT2P25		ST-2-25	TC-2	Video Coupling
C55	100		CC32A-101A	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Sound Coupling
C56	1000		HX36H-102	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	AVC Filter
C57	4700	500	MC61F-472	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	RF Bypass
C58	100		CC32A-101A	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Sound Coupling
C59	1000		HX36H-102	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	2nd S. IF Cath. Bypass
C60	4700	500	MC61F-472	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	RF Bypass
C61	.05	200		P288-05	GT2S5		ST-4-05	TM-15	AVC Filter
C62	47		CC30A-470F	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Diode Load Cap.
C63	47		CC30A-470F	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	" "
C64	2000		PA4334-3	1467-002	1W5D2	GP2M-002	MW.5-22	1FM-22	De-emphasis
C65	.02	400		P488-02	GT4S2		ST-4-02	TM-12	Audio Coupling
C66	.02	400		P488-02	GT4S2		ST-4-02	TM-12	" "
C67	.03	200		P488-03	GT6S3		ST-6-03	TM-13	Tone Compensation
C68	1000		HX36H-102	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	AVC Filter
C69	.02	400		P488-02	GT4S2		ST-4-02	TM-12	Audio Coupling
C70	5100	500	MC61G-512	1468-0005	1D5D2	GP2M-005	MW.5-25	1FM-25	Tone Compensation
C71	.006	600		P688-006	GT6D6		ST-6-006	TM-26	Output Plate Bypass
C72	4700	500	MC61F-472	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Filament Bypass
C73	4700	500	MC61F-472	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	" "
C74	1000		HX36H-102	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	" "
C75	1000		HX36H-102	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	" "
C76	4700	500	MC61F-472	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	" "
C77	4700	500	MC61F-472	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	" "
C78	.01	600		P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Sync. Coupling
C79	.25	600		P488-25	GT4P25		ST-4-25	TC-2	" "
C80	.01	400		P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	" "
C81A	3300		PA4339-1						Integrator Net.
B	4700								" "
C	4700								" "
C82	4700	500	MC61F-472						Vert. Osc. Grid Cap.
C83	5000		PA4334-1	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Vert. Hold Bypass
C84	.25	400		P488-25	GT4P25		ST-4-25	TC-2	Vert. Coupling
C85	.1	400		P488-1	GT4P1		ST-4-1	TM-1	Vert. Discharge
C86	.1	200		P288-1	GT2P1		ST-2-1	TM-1	Fixed Trimmer
C87	470	500	MC60E-471	1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	Sync. Coupling
C88	470	500	MC60E-471	1468-0005	5W5T5	GP2K-500	MO.5-35	1FM-35	" "
C89	6800	500	MC61F-682		1D3D7		MW.5-27	1FM-27	" "
C90	.1	200		P288-1	GT2P1		ST-2-1	TM-1	AFC Filter
C91	220	500	MC60E-221	1468-0002	5W5T2	GP2K-200	MO.5-32	1FM-32	Hor. Osc. Feedback
C92	680	500	MC60F-681		1W5T2		MW.5-27	1FM-37	AFC Feedback
C93	4700	500	MC61F-472	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Hor. Coupling
C94	.5	200		P288-5	GT2P5		ST-2-5	TC-5	Hor. Output Cath. Byp.
C95	.25	400		P488-25	GT4P25		ST-4-25	TC-2	Hor. Output Screen Byp
C96	68	500							Fixed Trimmer
C97	.04	200		P288-04	GT6S4		ST-6-04	TM-12	" "
C98	.06	400		P488-05	GT4S5		ST-6-06	TM-16	Hor. Coupling
C99	.05	400		P488-05	GT4S5		ST-4-05	TM-15	HV Osc. Decoup.
C100	.05	400		P488-05	GT4S5		ST-4-05	TM-15	" "
C101	.05	400		P488-05	GT4S5		ST-4-05	TM-15	HV Osc. Cath. Byp.
C102	1500	500	MC61E-152	1464-0015	1R5D15		MW.5-215	1FM-215	Fixed Trimmer
C103	5600	500	MC61F-562						HV Osc. Grid Cap.
C104	470	10000	PA4338				STM-16-006	MB-26	HV Filter
C105	.006	1000	PC40N-602	P1088-006	GT16D6				Output Plate Bypass
C106	.02	400	PC40L-203	P488-02	GT4S2		ST-4-02	TM-12	Audio Coupling
C107	.01	200	PC40K-103	P488-01	GT2S1	GP2-335-01	ST-4-01	TM-11	Tone Compensation
C108	.05	400	PC40L-503	P488-05	GT4S5		ST-4-05	TM-15	Decoupling
C109	.01	400	PC40K-103	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	RF Bypass
C110	.01	400	PC40F-103	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	AVC Filter
C111	.05	200	PC40K-503	P288-05	GT2S5		ST-4-05	TM-15	RF Coil Isolation
C112	150	500	MC60F-151	1468-00015	5W5T1S	GP2K-150	MO.5-315	1FM-315	AF Plate Bypass
C113	20000		HX35G-203	P488-02	GT4S2		ST-4-02	TM-12	Decoupling
C114	20000		HX35G-203	P488-02	GT4S2		ST-4-02	TM-12	Audio Coupling
C115	2000		HX35G-202	P688-002	GT6S02	GP2M-002	ST-6-002	TM-22	Photo Tone Comp.
C116	250		HX35F-531	1468-0003	5W5T3	GP2K-300	MO.5-33	1FM-335	Diode Load Cap.
C117	2000		See Note 1	1467-002	1W5D2	GP2M-002	MW.5-22	1FM-22	De-emphasis
C118	20000		HX35G-203	P488-02	GT4S2		ST-4-02	TM-12	AVC Filter
C119	20000		HX35G-203	P488-02	GT4S2		ST-4-02	TM-12	3rd IF Plate Decoup.
C120	20000		See Note 8	P488-02	GT4S2		ST-4-02	TM-12	3rd IF Cath. Bypass
C121	100	500	MC60G-101	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	3rd IF Coupling
C122	20000		See Note 2	P488-02	GT4S2		ST-4-02	TM-12	2nd IF Cath. Bypass
C123	1000		See Note 3	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	AVC Filter
C124A	100		See Note 4	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Diode Filter †
B	100		See Note 4	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	" " †
C125	20000		HX35G-203	P488-02	GT4S2		ST-4-02	TM-12	1st IF Plate Decoupling
C126	20000		See Note 5	P488-02	GT4S2		ST-4-02	TM-12	1st IF Screen Bypass
C127	20000		See Note 6	P488-02	GT4S2		ST-4-02	TM-12	1st IF Cath. Bypass
C128	20000		See Note 7	P488-02	GT4S2		ST-4-02	TM-12	AVC Filter
C129	20000		HX35G-203	P488-02	GT4S2		ST-4-02	TM-12	Conv. Plate Decoup.
C130	1000	500	PA4325-2	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	Osc. Anode Bypass
C131	51	500	MC60G-510	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Osc. Grid Cap.
C132	85		PA4328-6						Fixed Padder
C133	10		CC31H-100K	1468-00001	5W5Q1	GP1K-10	MO.5-41	MS-41	Osc. Feedback
C134	5		PA4328-5	1468-000005	5W5V5	NP0K-5	MO.5-55	MS-55	RF Coupling
C135	46		PA4328-2						Fixed Padder
C136	51		CC31H-510K	1469-00005	5R5Q5	GP1K-50	MO5.5-45	MS-45	Fixed Trimmer
C137	20000		HX35G-203	P488-02	GT4S2		ST-4-02	TM-12	RF Bypass
C138	1000	500	PA4325-2	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	RF Screen Bypass
C139	10000	500	PA4325-1	1467-01	1D5S1	GP2-335-01	MW.3-11	1FM-11	RF Cath. Bypass

CAPACITORS (CONT.)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SPARTON PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C140	51		PA4328-6	1469-00005	5R5Q5	GP1K-50	MO5.5-45	MS-45	Fixed Padder
C143	51	500	MC60G-510	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	RF Coupling
C144	1000	500	PA4325-2	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	Filament Bypass

§ When either item C62 or C63 are replaced, replace both with capacitors of equal value.
† When either item C124A or C124B are replaced, replace both with capacitors of equal value.

Note 1. Item C117 and R151 are combined into one unit obtainable under MFGRS Pt. No. PA4330-7
Note 2. Item C122 and R149 are combined into one unit obtainable under MFGRS Pt. No. PA4330-6
Note 3. Item C123 and R146 are combined into one unit obtainable under MFGRS Pt. No. PA4330-8
Note 4. Item C124A,B & R143 are combined into one unit obtainable under MFGRS Pt. No. PA4329-3
Note 5. Item C126 and R140 are combined into one unit obtainable under MFGRS Pt. No. PA4330-5
Note 6. Item C127 and R141 are combined into one unit obtainable under MFGRS Pt. No. PA4330-4
Note 7. Item C128 and R139 are combined into one unit obtainable under MFGRS Pt. No. PA4330-6
Note 8. Item C120 and R147 are combined into one unit obtainable under MFGRS Pt. No. PA4330-6

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SPARTON PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
R1A	350KΩ	½	PA4418	D18-132X	AT-70	Volume control tapped @ 60KΩ
B	Shaft		Not Req.	E	KSS-3	Attach to R1A Per Instructions
R2A	1 Meg.	½	PA4414	D11-137	AM-61-S	Tone control
B	Shaft		Not Req.	E	KSS-3	Attach to R2A Per Instructions
R3	3000Ω	1	PA4417		BT-58-S	Contrast control
R4A	500KΩ	½	PA4415	D11-133	M-58-S	Vert. hold control
B	Shaft		Not Req.	A	Not Req.	Attach to R4A Per Instructions
R5A	500KΩ	½	PA4416	D11-133	M-58-S	Horiz. hold control
B	Shaft		Not Req.	A	Not Req.	Attach to R5A Per Instructions
R6	10KΩ	1	PA4413	W-10K	43-10K	Vert. Size control
R7	5000Ω	1	PA4411	W-5000	43-5000	Horiz. size control
R8	5000Ω	1	PA4411	W-5000	43-5000	Vert. linearity control
R9	2500Ω	½	PA4412		M-15-S	Brightness control
R10	1000Ω	2	PA4410	W-1000	58-1000	Focus control
R11A	500KΩ	½	PA4407-2	D13-133	M-60-2	Volume control (AM-FM Chassis)
B	Shaft		Not Req.	A	Not Req.	Attach to R11A Per Instructions
R12A	50KΩ	½	PA4400-7	D13-133*	AM-60-2*	Tone control (AM-FM Chassis)
B	Shaft		Not Req.	E	KSS-3	Attach to R12A Per Instructions
C	Switch		Not Req.	41	SW-A	" " " "

* Use original sleeve on control shaft

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SPARTON PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES All resistors are ± 10% unless otherwise stated.
R13	100KΩ	½			Ant. Shunt 20%
R14	100KΩ	½			" " 20%
R15	47KΩ	½		BTS-47K	RF Grid
R16	1000Ω	½		BTS-1000	AGC Network
R17	100Ω	½			RF Cathode
R18	2200Ω	½		BTS-2200-5%	RF Plate 5%
R19	15KΩ	½		BTS-15K	RF Screen
R20	1 Meg.	½		BTS-1 Meg.	Mixer Grid
R21	56KΩ	½		BTS-56K	Mixer Screen Decoupling
R22	18KΩ	½		BTS-18K	Osc. Grid
R23	470Ω	½		BTS-470	Osc. Plate
R24	15KΩ	½	BR12G-153		1st Video IF Grid 5%
R25	100Ω	½	BR12S-101		1st Video IF Cathode
R26	1000Ω	½	BR12N-102	BTS-1000	AGC Network
R27	150KΩ	½	BR12N-152	BTS-1500	Mixer Decoupling 20%
R28	15KΩ	½	BR12S-153	BTS-15K	1st Video IF Screen Decoupling
R29	1500Ω	½	BR12N-152	BTS-1500	1st Video IF Decoupling 20%
R30	470Ω	½	BR12G-472		2nd Video IF Grid 5%
R31	100Ω	½	BR12S-101		2nd Video IF Cathode
R32	15KΩ	½	BR12S-153	BTS-15K	2nd Video IF Screen Decoupling
R33	1500Ω	½	BR12N-152	BTS-1500	2nd Video IF Decoupling
R34	1000Ω	½	BR12N-102	BTS-1000	AGC Network
R35	15KΩ	½	BR12G-153		3rd Video IF Grid 5%
R36	100Ω	½	BR12S-101		3rd Video IF Cathode
R37	15KΩ	½	BR12S-153	BTS-15K	3rd Video IF Screen Decoupling
R38	1500Ω	½	BR12N-152	BTS-1500	3rd Video IF Decoupling 20%
R39	2200Ω	½	BR12G-222		4th Video IF Grid 5%
R40	100Ω	½	BR12S-101		4th Video IF Cathode
R41	15KΩ	½	BR12S-153	BTS-15K	4th Video IF Screen Decoupling
R42	1500Ω	½	BR12N-152	BTS-1500	4th Video IF Decoupling 20%
R43	3300Ω	½	BR12G-332		1st Video Amp. Grid 5%
R44	150Ω	½	BR12N-151		Video Det. Load 20%
R45	2700Ω	½	BR12S-272	BTS-2700	1st Video Amp. Cathode
R46	1800Ω	½	BR12G-182	BTS-1800-5%	1st Video Amp. Plate 5%
R47	3900Ω	½	BR12S-392	BTS-3900	Peaking Coil Shunt
R48	68KΩ	½	BR12S-683	BTS-68K	1st Video Amp. Screen Dropping
R49	470KΩ	½	BR12N-474	BTS-470K	2nd Video Amp. Grid
R50	82Ω	½	BR12S-821	BTS-820-5%	2nd Video Amp. Cathode 5%
R51	6800Ω	2	BR12G-682	BT-2-6800-5%	2nd Video Amp. Plate 5%
R52	3300Ω	½	BR12S-332	BTS-3300	2nd Video Amp. Decoupling See Note 9
R53	100KΩ	1	CR12S-104	BTS-100K	2nd Video Amp. Screen Decoupling
R54	4700Ω	½	BR12S-472	BTS-4700	Voltage Divider
R55	470Ω	½	BR12S-472	BTS-4700	" "
R56	1.5 Meg.	½	BR12N-155	BTS-1.5 Meg.	Picture Tube Grid 20%
R57	6800Ω	2	BR12S-682	BTA-6800	Voltage Divider
R58	47KΩ	1	CR12S-473	BTA-47K	
R59	472				Decoupling
R60	3300Ω	½	BR12G-332	BTS-3300-5%	Aux. Video Grid 5%
R61	470Ω	½	BR12S-471	BTS-470	Aux. Video Cathode
R62	10KΩ	½	BR12S-103	BTS-10K	Aux. Video Plate Bleeder
R63	2.2 Meg.	½	BR12N-225	BTS-2.2 Meg.	AGC Network
R64	33KΩ	2	BR12G-333	BT-2-33K-5%	Aux. Video Plate Load 5%
R65	1 Meg.	½	BR12N-105	BTS-1 Meg.	AGC Load
R66	220KΩ	½	BR12N-224	BTS-220K	Sync. Sep. Load
R67	10KΩ	½	BR12N-103	BTS-10K	Sync. Sep. Load 20%
R68	15KΩ	½	BR12S-153	BTS-15K	Voltage Divider
R69	47KΩ	½	BR12N-473	BTS-47K	Sync. Amp. Decoupling 20%
R70	15KΩ	½	BR12N-153	BTS-15K	Sync. Amp. Plate
R71	22KΩ	½	BR12N-223	BTS-22K	Sync. Amp. Grid
R72	1 Meg.	½	BR12N-105	BTS-1 Meg.	" "
R73	27KΩ	½	BR12S-273	BTS-27K	Sync. Amp. Plate
R74	100KΩ	½	BR12S-104	BTS-100K	1st Sound IF Grid
R75	100KΩ	½	BR12N-104	BTS-100K	AVC Network 20%
R76	82Ω	½	BR12S-820		1st Sound IF Cathode
R77	100KΩ	½	BR12S-104	BTS-100K	2nd Sound IF Grid

SPARTON MODELS 4900TV, 4939TV, 4940TV, 4941TV

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (CONT.)

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES	
	RESISTANCE	WATTS	SPARTON PART No.	IRC PART No.		
R78	68Ω	½	BR12S-680		2nd Sound IF Cathode	
R79	220Ω	½	BR12S-221		Balancing	
R80	10KΩ	½	BR12S-103	BTS-10K	Ratio Det. Diode Load	
R81	10KΩ	½	BR12S-103	BTS-10K	" " " "	
R82	220KΩ	½	BR12N-224	BTS-220K	AVC Network	
R83	27KΩ	½	BR12S-273	BTS-27K	De-emphasis	
R84	10KΩ	½	BR12S-103	BTS-10K	Tone Compensation	
R85	10 Meg.	½	BR12N-106	BTS-10 Meg.	AF Grid	
R86	270KΩ	½	BR12S-274	BTS-270K	AF Plate	
R87	2.2 Meg.	½	BR12N-225	BTS-2.2 Meg.	AVC Network	
R88	470KΩ	½	BR12S-474	BTS-470K	Output Grid	
R89	390Ω	1	CR12S-391	BTA-390	Output Cathode	
R90	1200Ω	2	DR12S-122	BT-2-1200	Filter	
R91	1200Ω	2	DR12S-122	BT-2-1200	"	
R92	1500Ω	½	BR12S-152	BTS-1500	Sync. Amp. Grid	
R93	2200Ω	½	BR12G-222	BTS-2200	Sync. Amp. Cathode	
R94	6800Ω	½	BR12G-682	BTS-6800-5%	Sync. Amp. Plate	5%
R95	3300Ω	½	BR12G-332	BTS-3300-5%	Sync. Amp. Plate	5%
R96	2200Ω	½	BR12G-222	BTS-2200	Sync. Amp. Decoupling	20%
R97	100KΩ	½	BR12G-104	BTS-100K-5%	AFC Diode Load	5%
R98	100KΩ	½	BR12G-104	BTS-100K-5%	" " "	5%
R99	12KΩ	1	CR12S-123	BTA-12K-5%	Horiz. Osc. Decoupling	5%
R100	470KΩ	½	BR12S-474	BTS-470K	Horiz. AFC Filter	
R101	3300Ω	½	BR12S-332	BTS-3300	AFC Feedback	
R102	1000Ω	½	BR12S-102	BTS-1000	Horiz. Osc. Cathode	
R103	47KΩ	½	BR12S-473	BTS-47K	Horiz. Osc. Plate	
R104	330KΩ	½	BR12G-334	BTS-330K-5%	Series Neon	5%
R105	330KΩ	½	BR12S-334	BTS-330K	Horiz. Osc. Plate	
R106	390KΩ	½	BR12G-394	BTS-390K-5%	Voltage Divider	5%
R107	470KΩ	½	BR12S-474	BTS-470K	Horiz. Osc. Grid	
R108	82KΩ	½	BR12G-823	BTS-82K-5%	Voltage Divider	5%
R109	470KΩ	½	BR12S-474	BTS-470K	Horiz. Output Grid	
R110	180Ω	2	DR12S-181		Horiz. Output Cathode	
R111	4700Ω	½	CR12S-472	BTS-4700	Horiz. Output Screen Decoupling	
R112	68Ω	½			Linearity Network	
R113	150Ω	2	DR12S-151	BW-2-150	Focus Coil Shunt	
R114	180Ω	2	DR12S-181	BW-2-180	" " "	
R115	22KΩ	½	BR12S-223	BTS-22K	Integrator Network	
R116	8200Ω	½	BR12S-822	BTS-8200	" "	
R117	8200Ω	½	BR12S-822	BTS-8200	" "	
R118	47KΩ	½	BR12S-473	BTS-47K	Differenator	
R119	4300Ω	2	DR12G-432		Voltage Dropping	5%
R120	330KΩ	½	BR12N-334	BTS-330K	Vert. Osc. Plate	
R121	3900Ω	½	BR12S-392	BTS-3900	Vert. Peaking	
R122	3.3 Meg.	½	BR12N-335	BTS-3.3 Meg.	Vert. Output Grid	20%
R123	470Ω	½	BR12N-471	BTS-470	Vert. Output Cathode	20%
R124A	5000Ω	8	PA4205	AB-5000	Bleeder	
B	10KΩ	2		BW-2-10K	Bias Network	
R125	470Ω	1	CR12N-471	BTA-470	HV Osc. Cathode	20%
R126	3900Ω	1	CR12N-392	BTA-3900	HV Osc. Grid	
R127	220Ω	½	BR12N-221	BW-½-220	HV Osc. Decoupling	20%
R128	220Ω	½	BR12N-221	BW-½-220	" " "	20%
R129	470KΩ	½	BR12N-474	BTA-470K	HV Filter	
R130	2200Ω	½	BR12S-222	BTS-2200	Ant. Loading	
R131	1 Meg.	½	BR12S-105	BTS-1 Meg.	RF Grid	
R132	68Ω	½	BR12S-680		RF Cathode	
R133	33KΩ	½	BR12S-333	BTS-33K	RF Screen	
R134	47Ω	½	BR12S-470		Parasitic Suppressor	
R135	1 Meg.	½	BR12S-105	BTS-1 Meg.	Converter Grid	
R136	22KΩ	½	DR12S-223	BT-2-22K	Converter Screen	
R137	1000Ω	½	BR12S-102	BTS-1000	Converter Plate Decoupling	
R138	22KΩ	½	BR12S-223	BTS-22K	Osc. Grid	
R139	100KΩ	½	See Note 1	BTS-100K	AVC Network	
R140	82KΩ	½	See Note 2	BTS-82K	1st IF Screen	
R141	270Ω	½	See Note 3		1st IF Cathode	
R142	1000Ω	½	BR12S-102	BTS-1000	1st IF Plate Decoupling	
R143	56KΩ	½	See Note 4	BTS-56K	Diode Filter	
R144	680KΩ	½		BTS-680K	AVC Network	
R145	1.5 Meg.	½		BTS-1.5 Meg.	" "	
R146	1 Meg.	½	See Note 5	BTS-1 Meg.	2nd IF Grid	
R147	270Ω	½	See Note 6		2nd IF Cathode	
R148	15KΩ	½	BR12S-153	BTS-15K	3rd IF Grid	
R149	270Ω	½	See Note 7		3rd IF Cathode	
R150	1000Ω	½	BR12S-102	BTS-1000	3rd IF Plate Decoupling	
R151	39KΩ	½	See Note 8	BTS-39K	De-emphasis	
R152	220Ω	½	BR12S-201		Balancing	
R153	470Ω	½	BR12S-471	BTS-470	"	
R154	15KΩ	½	BR12S-153	BTS-15K	Ratio Det. Diode Load	
R155	15KΩ	½	BR12S-153	BTS-15K	" " " "	
R156	1 Meg.	½	BR12S-105	BTS-1 Meg.	Phono Tone Compensation	
R157	10 Meg.	½	BR12S-106	BTS-10 Meg.	AF Grid	
R158	220KΩ	½	BR12S-224	BTS-220K	AF Plate	
R159	56KΩ	½	BR12S-563	BTS-56K	AF Plate Decoupling	
R160	470Ω	2	DR12S-471	BW-2-470	Output Cathode	
R161	820KΩ	½	BR12S-824	BTS-820K	Vert. Osc. Grid	
R162	220KΩ	½	BR12N-224	BTS-220K	Vert. Osc. Grid	
R163	2200Ω	1		BTA-2200	Focus Coil Shunt See Note 9	

Note 1. Item R139 and C128 are combined into one unit obtainable under MFGRS Pt. PA4330-4
Note 2. Item R140 and C126 are combined into one unit obtainable under MFGRS Pt. PA4430-5
Note 3. Item R141 and C127 are combined into one unit obtainable under MFGRS Pt. PA4430-6
Note 4. Item R143 and C124 (A & B) are combined into one unit obtainable under MFGRS Pt. PA4329-3
Note 5. Item R146 and C123 are combined into one unit obtainable under MFGRS Pt. PA4330-8
Note 6. Item R147 and C120 are combined into one unit obtainable under MFGRS Pt. PA4330-6
Note 7. Item R149 and C122 are combined into one unit obtainable under MFGRS Pt. PA4330-6
Note 8. Item R151 and C117 are combined into one unit obtainable under MFGRS Pt. PA4330-7
Note 9. Not used in all models.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	SPARTON PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1	117VAC @ 1.96A	750VAC CT @ .094ADC	5VAC @ 3A	6.3VAC @ 5.6A SEC. 4 6.3VAC @ 5.4A	AB44014-1			
T2	117VAC @ .55A	500VAC CT @ .07ADC	5VAC @ 2A	6.4VAC @ 2.6A	AB44010-1	P-8011*		P-2451*

* Add series resistor to reduce plate voltage.

TRANSFORMER (FILAMENT)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	SPARTON PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T3	6.3VAC @ 2.1A	5VAC @ 2A			AB47002-1†			

† This transformer is especially designed for low shunt capacity. Replace with factory unit only.

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING DC RESISTANCE SEC.	REPLACEMENT DATA SPARTON PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	NOTES
T4	60Ω	5.0Ω	AB47003-1	A-8121	TB0-1	A-4000	Vert. Block Osc. Trans.
T5	820Ω	4.5Ω	AB44062-1	A-8115	TS0-1	A-3035	Vert. Output Trans.
T6	475Ω		AA6660-1				Hor. Output Plate
T7A	30Ω		AB43525-1				Hor. Deflection Yoke
B	65Ω						Vert. Deflection Yoke
T8	180Ω		PC70001				Focus Coil

TRANSFORMER (H.V. OSC.)

ITEM No.	RATING DC RESISTANCE PRI.	RATING DC RESISTANCE SEC.	REPLACEMENT DATA SPARTON PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	NOTES
T9	1.8Ω	18Ω SEC. 2 500Ω SEC. 3 .5Ω	AB43521-1				

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA SPARTON PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	INSTALLATION NOTES
T10	7000Ω	3.4Ω	345Ω	.4Ω	AB44063-1	A-3823	RO-303	A-2901	
T11	6700Ω	3.5Ω	345Ω	.4Ω	AB44056-2	A-3877	RO-301	A-2931	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA SPARTON PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	V. C. IMP.				
SP1A	PM	3.4Ω	PC63000-12	ST-120 MOD.P10-S#	10A31	Models 4939TV, 4940TV, 4941TV
B	PM	3.5Ω	PC63000-21	ST-120*# MOD.P10-S	10A31*	Model 4900TV
	CONE DIA.	V. C. DIA.				
SP2A	5 1/2"	1"				* Drill new mounting holes.
B	5 1/4"	1"				# Replace output transformer to match 6-8Ω voice coil.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA SPARTON PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	INSTALLATION NOTES
L1	.240A	60Ω	4 Henry	AB77001-1	C-2326*		C-2991*	* Drill new mtg. holes
L2				AB47004-1				

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA SPARTON PART No.	MEISSNER PART No.	NOTES
L3	Ant. Coils	0Ω	0Ω			Part of Tuner Assy.
L4	RF Coils	0Ω				" " " "
L5	Osc. Coils	0Ω				" " " "
L6	Osc. Plate	0Ω				" " " "

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA SPARTON PART No.	REPLACEMENT DATA MEISSNER PART No.	NOTES
L7	Adjacent Sound IF Trap	0Ω				Part of Tuner Assy.
L8	RF Trap	0Ω		AA6654-1		
L9	1st Video IF	.1Ω		AB43523-1		
L10	Adjacent Sound IF Trap	0Ω		AB43524-1		
L11	2nd Video IF	.1Ω		AB43523-1		
L12	3rd Video IF	.1Ω		AB43523-2		
L13	IF Grid Chk.	1.5Ω		AA6644-1		Inductance-11 Microhenries
L14	Sound IF Trap	0Ω		AB43524-4		
L15	4th Video IF	.1Ω		AB43523-2		
L16	IF Grid Chk.	1.5Ω		AB6644-1		Inductance-11 Microhenries
L17	IF Trap	0Ω		AB43524-2		
L18	5th Video IF	.1Ω		AB43523-2		
L19	Peaking	2.8Ω		AA6650-1		Inductance-25 Microhenries
L20	Peaking	6Ω		AA6650-3		Inductance-95 Microhenries
L21	Peaking	6Ω		AA6650-3		Inductance-95 Microhenries
L22	Peaking	5.5Ω		AA6650-6		Inductance-83 Microhenries
L23	Peaking	10Ω		AA6650-7		Inductance-235 Microhenries
L24	Peaking	8Ω		AA6650-2		Inductance-150 Microhenries
L25	Peaking	7Ω		AA6650-5		Inductance-135 Microhenries
L26	Peaking	10Ω		AA6650-4		Inductance-200 Microhenries
L27	1st Sound IF	.2Ω		AA6663-2		
L28	RF Choke	.2Ω		AA6646-1		
L29	RF Choke	.2Ω		AA6651-1		Not used in all models.
L30	RF Choke	.2Ω		AA6646-1		" " " " "
L31	RF Choke	.2Ω		AA6651-1		
L32	Ratio Det.	.2Ω	0Ω	AA6684-2		
L33	Horiz. Linearity Control	16Ω		AA6659-1		
L34	Fil. Choke	.2Ω				Part of Tuner Assy. Part # PD93150-2
L35	Fil. Choke	.2Ω				" " " " " " "
L36	Fil. Choke	.2Ω				
L37	Fil.Choke	.2Ω				
L38	Fil. Choke	.2Ω				
L39	Fil. Choke	.2Ω				
L40	Fil. Choke	.2Ω				
L41	Fil. Choke	.2Ω				
L42	AM Loop Ant.	.2Ω		AC67008-4		
L43	Loop Loading Coil	2Ω		AA6686-2		
L44	FM Dipole Ant.	0Ω		AB41923		
L45A	FM Ant. Primary	0Ω		AA6786-1		
B	FM Ant. Secondary	0Ω		A6767-1		
L46	AM RF	60Ω	4.5Ω	AA6756-7		
L47	FM RF	0Ω		AA6767-5		
L48	AM Osc.	.8Ω	7Ω	AA6759-4	14-1060	
L49	FM Osc.	0Ω		AA6767-4		
L50A	AM 1st IF	11Ω	*9Ω	AA6768-3		* Includes FM-IF Secondary Winding
B	FM 1st IF	.8Ω				
L51A	AM 2nd IF	†9.5Ω	8Ω	AA6768-4		† Includes FM-IF Primary Winding
B	FM 2nd IF		.8Ω			
L52	FM 3rd IF	.5Ω		AA6720-5		
L53	Ratio Det.	1.5Ω	.8Ω	AA6684-1		
L54	RF Choke	0Ω		AA6769-2		
L55	RF Choke	0Ω		AA6798-1		Wound on 15MMF cap.

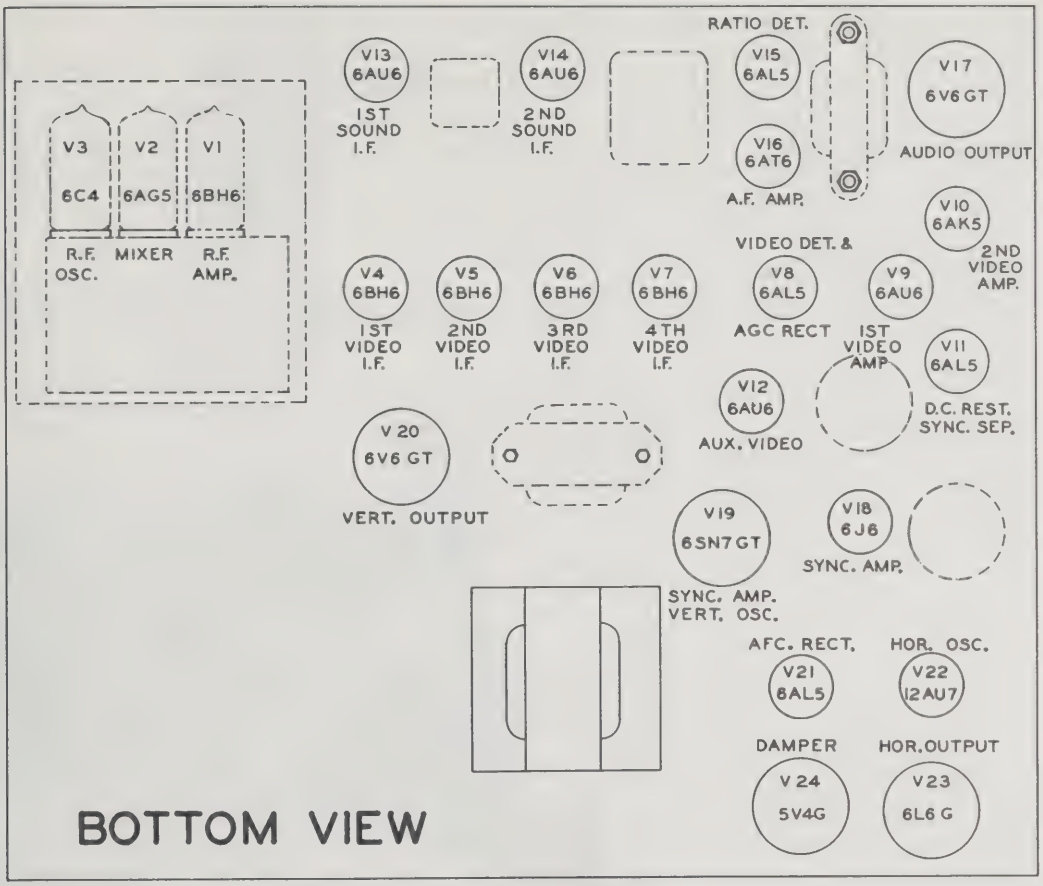
MISCELLANEOUS

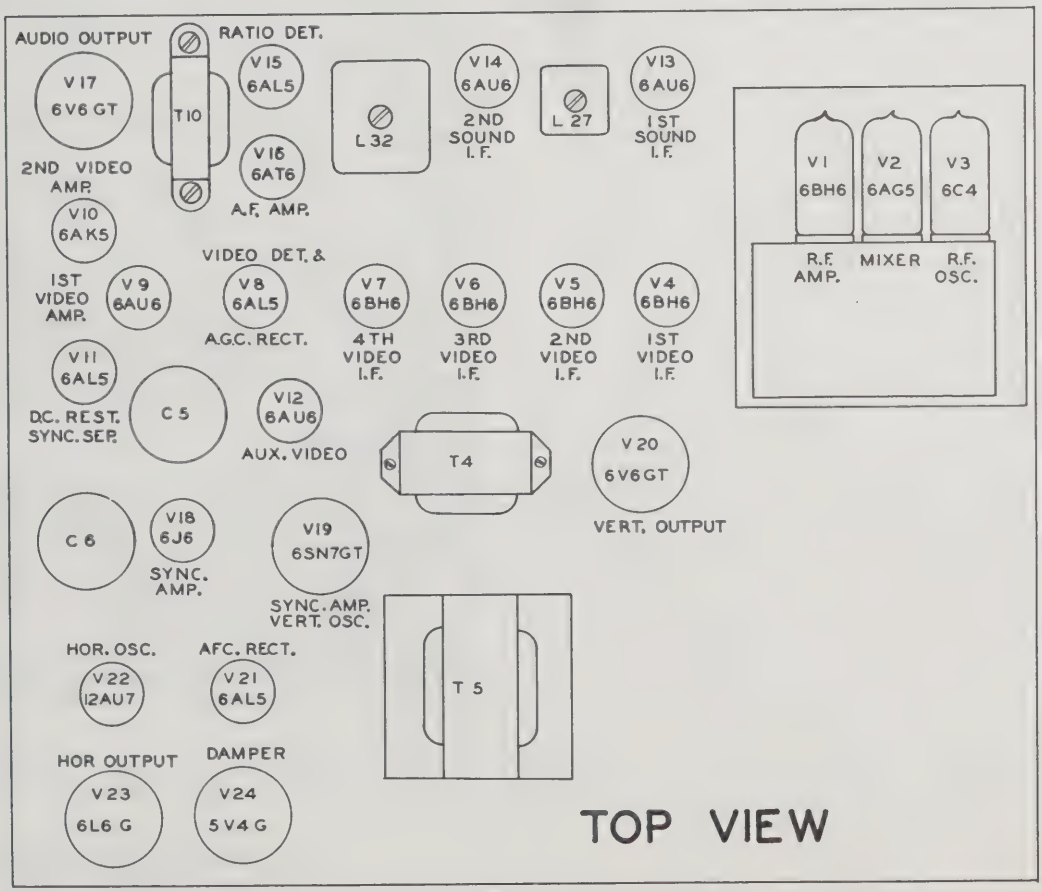
ITEM No.	PART NAME	SPARTON PART No.	NOTES
M1	Neon Lamp	PA4103	
M2	RF Tuner Assy.	PD93150-2	Complete with tubes
M3	Crystal	PA4206	Diode crystal-1N34
M4A	AC Switch	PB42008	Used in models #4939, 4940, and 4941
B	AC Switch	PB42007	Used in model #4900
M5	Socket	PB40202	Picture tube
M6	Band Switch	PB42005	
M10	Tuning Cap.	PC-65001	(17-422MMF) (17-422MMF) (17-422MMF) 3 Gang
	Cord	PA4004	Power interlock
	Escutcheon	PB40002	Channel indicator
	Channel Indicator	PB40003	
	Knob	AA6641-3	Tuning
	Knob	AA6641-4	Picture control
	Knob	AA6641-1	Tone control
	Knob	AA6641-5	Channel selector
	Knob	AA6641-2	Volume control
	Mask 10" Tube	PC63047	Used on models # 4934, 4940, and 4941
	Mask 12" Tube	PC63048	Used on model #4900

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA SPARTON PART No.		NOTES
M6	Bayonet	6-8V	0.25A	Blue	PA4100-3		Type #44
M7	Bayonet	6-8V	0.25A	Blue	PA4100-3		Type #44
M8	Bayonet	6-8V	0.25A	Blue	PA4100-3		Type #44

TUBE PLACEMENT CHART





PHOTOFACT* Folder

STEWART-WARNER MODELS
AVT1, AVC1, AVC2

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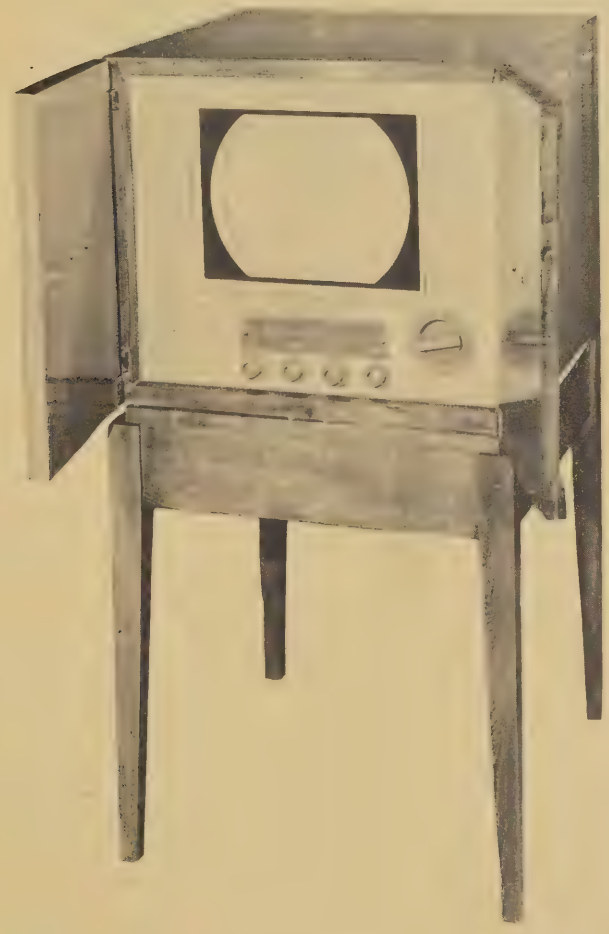

Model AVT1

STEWART-WARNER MODELS
AVT1, AVC1, AVC2

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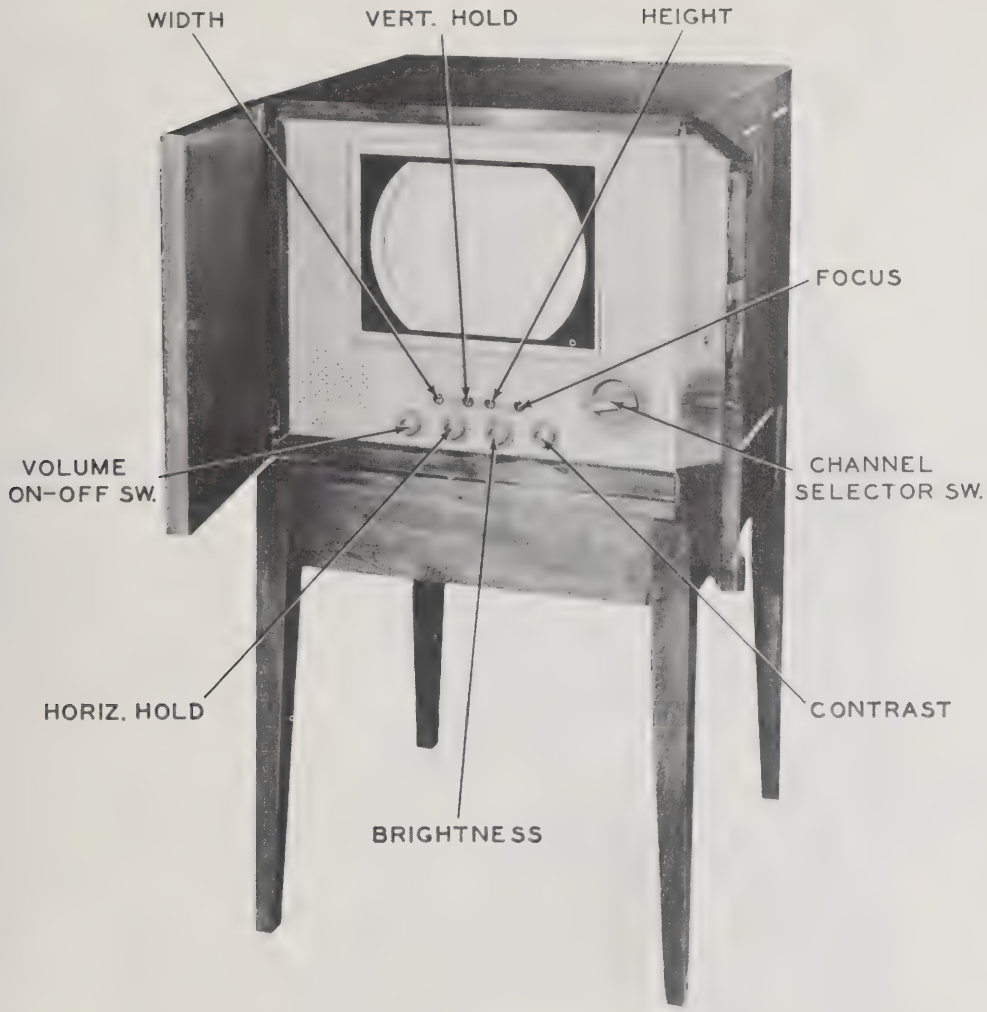

STEWART-WARNER MODEL AVT1

TRADE NAME	Stewart-Warner Models AVT1 (9053-A) AVC1 (9054-B) AVC2 (9054-C)
MANUFACTURER	Stewart-Warner Corp., 1826 Diversey Pkwy., Chicago, Illinois
TYPE SET	Television Receiver
TUBES	Twenty-Five
POWER SUPPLY	117 Volts, 60 Cycles AC, or DC with Polarizing Relay
TUNING RANGE—Channels 2 through 13	RATING 1.8 Amps @ 117 Volts

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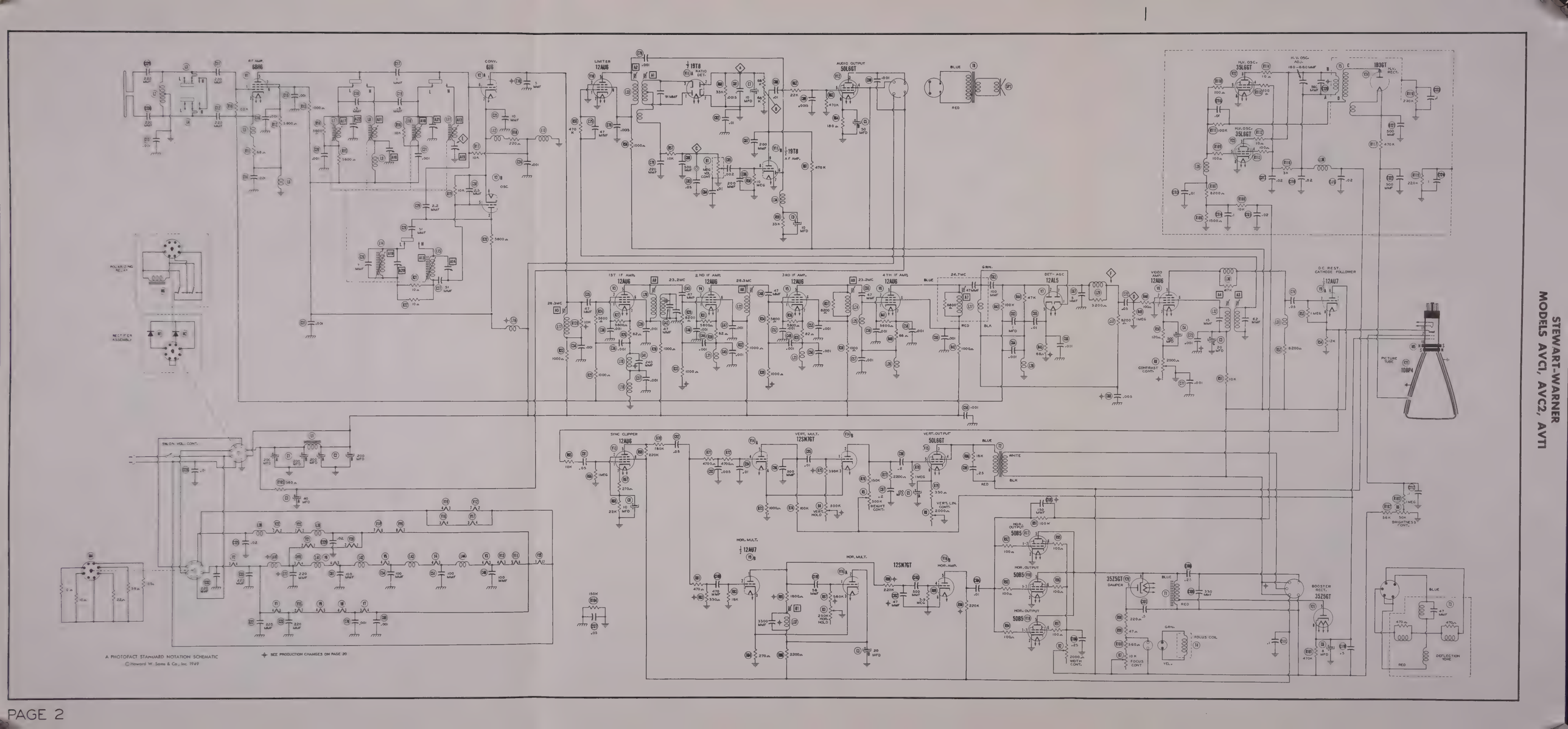
DATE 6/49 4912-12 SET #64 FOLDER 12

STEWART-WARNER
MODELS AVC1, AVC2, AVT1



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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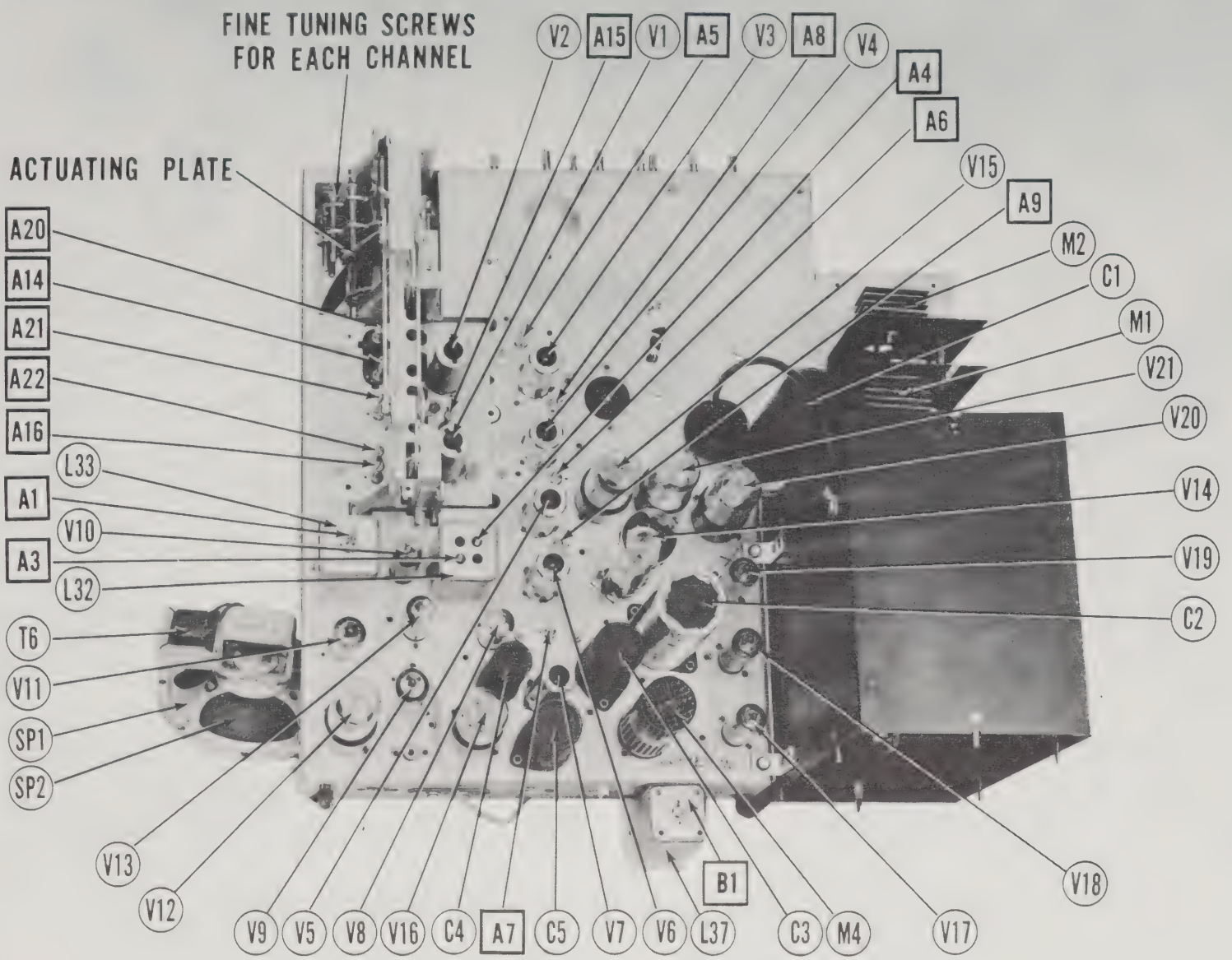
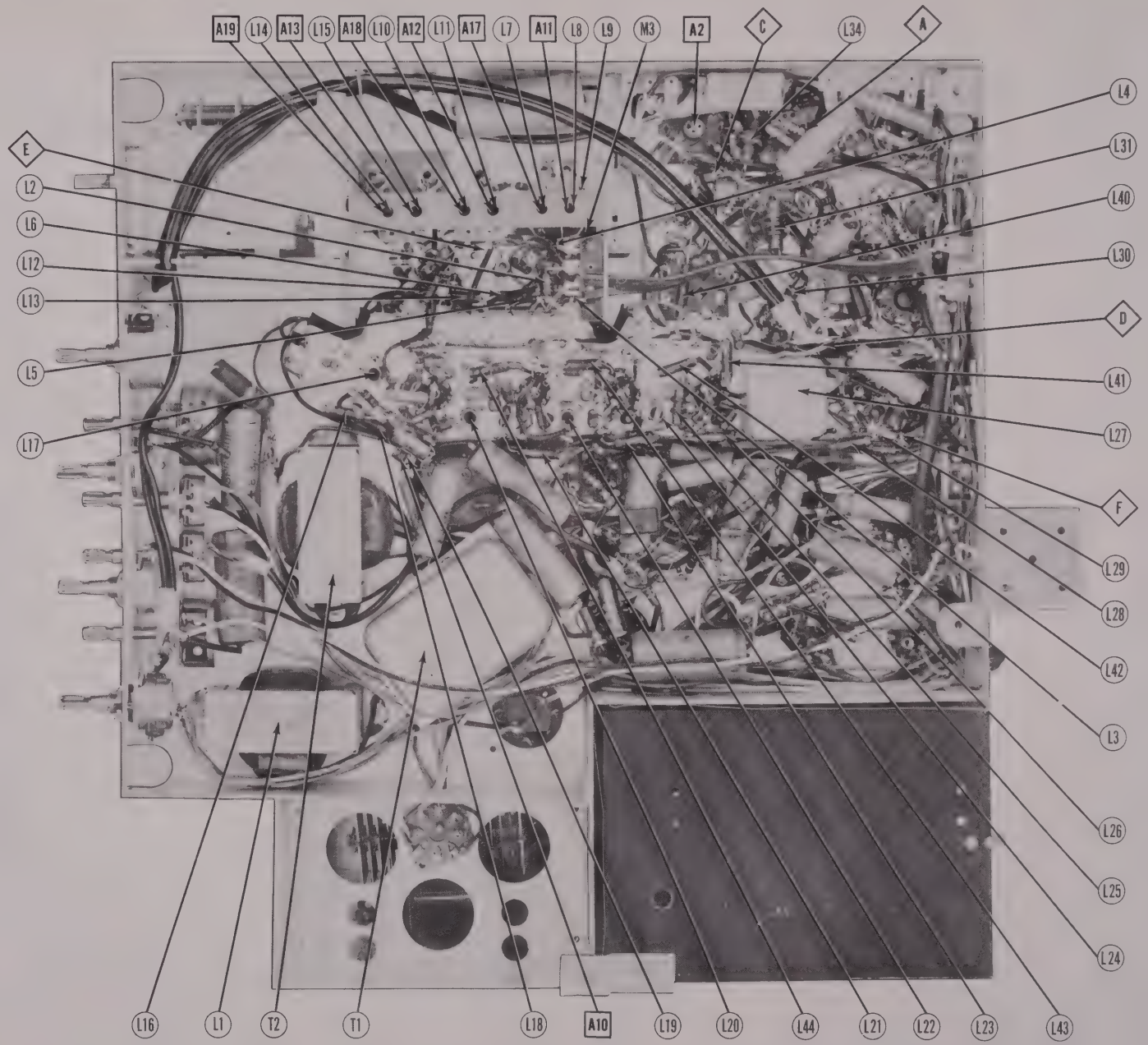
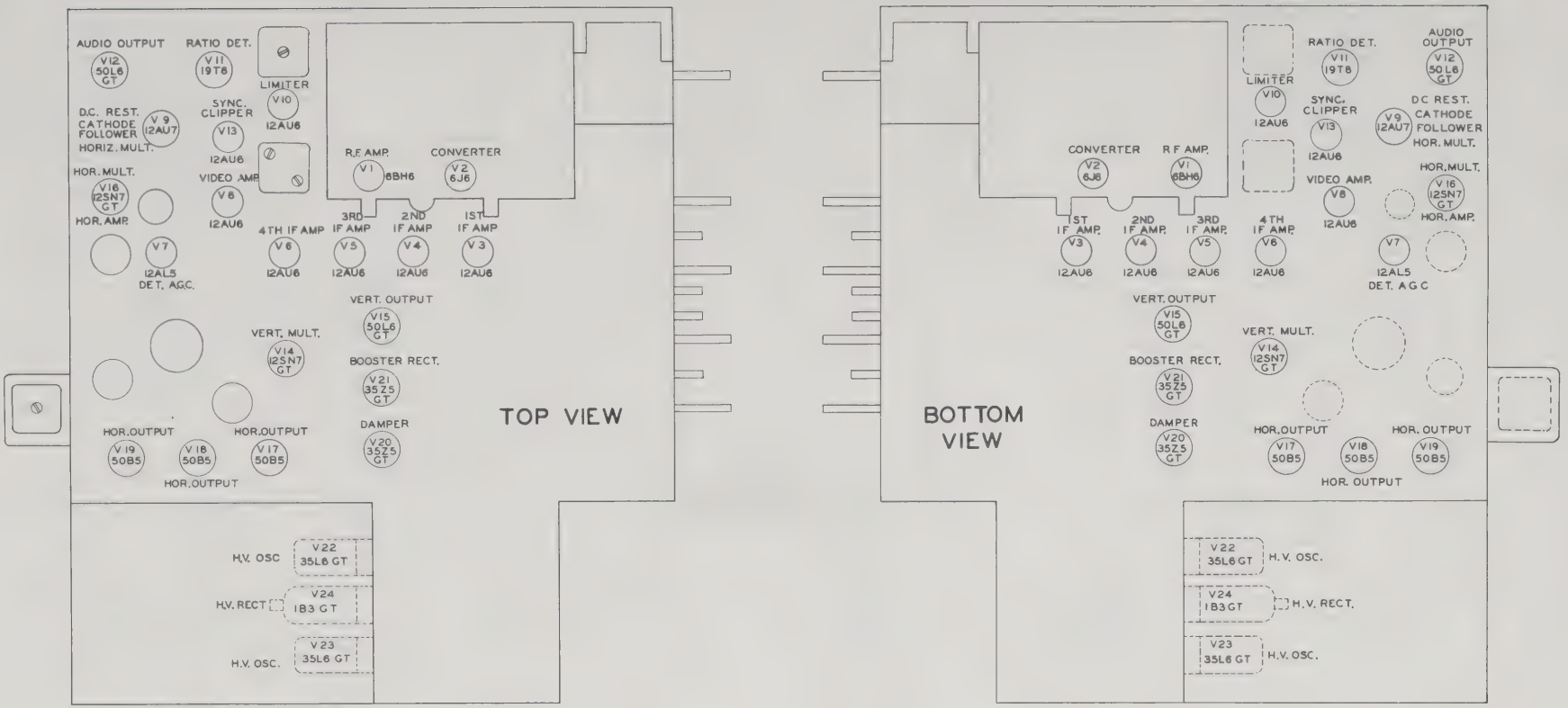


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



TUBE PLACEMENT CHART

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

(A). The sound and video IF channels may be aligned individually if desired but it is recommended alignment be performed in the sequence given.

(B). The receiver chassis must be removed from the cabinet to align the set as some of the adjustments are located beneath the chassis. For the table model sets, the chassis may be removed without disturbing the picture tube or speaker. Inner-connection between the various components may be accomplished by the extension cables listed below which are available from your Stewart-Warner distributor.

#507443 High voltage Ext. Cable & Plugs
#507444 Deflection Yoke Ext. Cable & Plugs
#507445 Picture Tube Ext. Cable & Plugs
#507446 Focus Coil Ext. Cable & Plugs
#507447 Speaker Ext. Cable & Plugs

For console models, it will be necessary to remove the picture tube before the chassis can be taken out. Leave the speaker in the cabinet and use the extension cables listed above for inter-connections.

TEST EQUIPMENT INSTRUCTIONS

(A). The B- system of this receiver is connected directly to one side of the AC power line. It, therefore, is necessary to observe the following precautions before connecting the test instruments. Failure to do so may result in severe shock if contact is made between the test equipment and ground.

1. Connect an AC voltmeter to B- of the receiver chassis and "earth" ground (radiator or water pipe, etc.). If the meter reading is not zero, reverse the receiver power plug.

2. Connect the AC voltmeter between "earth" ground and the ground terminal of the test instrument. If meter reads full voltage reverse the test instrument power plug. If meter reads 60 volts or less, do not reverse the power plug.

3. The ground terminal of the test instrument may now be connected to the B- system of the receiver.

The above precautions can be avoided if an isolation transformer is connected between the receiver and the power line.

(B). An alignment tool kit (Part No. 507475) with special tools is available from Stewart-Warner distributors. These tools are of special design and are color coded for RF tuner adjustments and will greatly expedite alignment of the receiver.

SOUND IF ALIGNMENT

(A). Set the contrast control in the fully clockwise position. The other controls may be left in any desired setting.

(B). In step 2, two matched 68KΩ (±1%) resistors connected in series are connected between pin 2 of the 19T8 (V11) and B-. The junction of these two resistors is point B as indicated on schematic.

(C). Turn the channel selector switch to any inactive channel and connect a jumper across the antenna input terminals.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1	5000MMF	High side to Point D at the video amp. grid. (V8). Low side to chassis.	4.5MC (Very Accurate)	Any	DC Probe to Point (A) Common to B-.	A1, A2 A3, A4	Adjust for maximum deflection.
2	5000MMF	"	"	"	DC Probe to Point (C) Common to Point (B)	A1	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. After this adjustment is completed, remove the two 68KΩ resistors.

SOUND IF VISUAL CHECK

(A). Connect the synchronized voltage from sweep generator to the horizontal amplifier of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
3	5000MMF	High side to Point D at video amp grid (V8). Low side to chassis.	4.5MC (500KC Sweep)	4.5MC (Very Accurate)	Any	Vert. Amp. shunted by 1000MMF thru 10KΩ to point (C) Low side to B-.		Check to see that pattern is obtained similar to Fig 1. The 4.5MC marker should appear at the center point and the slope should be linear for at least 50KC either side of this point. Slight adjustment of A1 may be necessary to correctly position the marker. Slight adjustment of A2, A3, and A4 is necessary only if adjustment of A1 fails to center the marker.

VIDEO IF ALIGNMENT

(A). Turn channel selector switch to channel #13 and connect a jumper across the antenna terminals.

(B). Connect a 1 1/2 volt battery to the AGC system- negative side to AGC line, positive to B-.

(C). Before aligning any of the IF stages, trap coil L19 (A10) must be detuned. This is accomplished by compressing the windings so they are closely spaced. Failure to do this may cause regeneration in the IF strip thereby preventing correct alignment.

(D). If the IF system is badly out of alignment and is oscillating, detuning the IF coils in different directions may stop the oscillations. If that fails to stop the oscillation, use a 3 or 4 1/2 volt battery instead of 1 1/2 volts on the AGC line. After aligning with the 3 or 4 1/2 volt battery change back to the 1 1/2 volt battery when using the oscilloscope to observe the band pass characteristics.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
4	5000MMF	High side to Point E. Low side to tuner chassis.	26.3MC	Any	DC Probe thru 15KΩ resistor to Point (F) Common to B-.	A5, A6	Adjust for maximum deflection.
5	5000MMF	"	24.7MC	"	"	A7	" " " "
6	5000MMF	"	23.2MC	"	"	A8, A9	" " " "

OVERALL VIDEO IF RESPONSE CHECK

(A). Use a 1 1/2 volt battery on the AGC line.

(B). Leave the VTVM connected at point F as in steps 4, 5, and 6. Attenuate the output of the sweep generator so VTVM reading is one volt.

(C). Do not use too much marker generator output which would cause distortion of the pattern obtained on the oscilloscope.

Connect the synchronized voltage from the sweep generator to the horizontal amplifier of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7	5000MMF	High side to Point E. Low side to tuner chassis.	25.0MC (10MC Sweep) (Attenuate output to give one volt reading on VTVM connected as in steps 4, 5, & 6)	22.25MC	13	Vert. Amp. shunted by 1000MMF thru 10KΩ to Point (F) Low side to B-.	A10	Pattern obtained should be similar to Fig 2. Adjust spacing of coil turns of L19 (A10) so 22.25MC marker rides on "Plateau" approx. 20% out from steep side of the pattern. If the top of the response pattern is not similar to Fig 2, slight adjustment of A7 may be sufficient. If not, determine whether the curve has a high or low freq. peak. Adjustment A5 and A6 control the high freq. side of the curve, while A8 and A9 control the low freq. side. By Making slight adjustment of the high or low freq. adjustments it is possible to obtain the correct pattern.

RF ALIGNMENT

(A). Connect a 1 1/2 volt battery to the AGC system-negative to AGC line, positive to B-.
(B). Do not remove the shield on the underside of the RF tuner unit.
(C). Before starting alignment of the RF tuner it is necessary to set the tuning slugs to their correct mechanical position as shown in Fig 3. This is done by turning the channel selector switch to channel #12 and then using the three special tools supplied in alignment tool kit 507475. Note the bottom tip of each slug is color coded and that aligning tools are identified by corresponding colors as the tools differ in length.

Using the correct color coded tool for a particular slug, insert the tool through the coil opening in the bottom of the tuner so that it engages a slot in the bottom of the slug. Turn the slug counter clockwise several turns so as to assure the tool has properly engaged the slug.

Press the actuating plate of the tuner mechanism back against its mechanical stop so the slugs are withdrawn from their coil forms as far as possible. Now turn the aligning tool clockwise until the slug disengages from the aligning tool. This automatically determines the correct setting as the alignment tools have been made a specific length.

All six slugs (A11, A12, A13, A17, A18 and A19) should be set in this manner using the alignment tool corresponding in color to the color on the bottom tip of the tuning slug. (See Fig 3).

HIGH BAND ALIGNMENT

(A). After positioning slugs mechanically as in paragraph "C" under RF channel alignment instructions, turn the channel selector switch to channel #12.

(B). Turn the fine tuning adjustment screw for channel 12 clockwise until the tuner actuating plate has moved back as far as it will go and presses against its mechanical stop- DO NOT FORCE SCREW BEYOND THIS POINT. Now back off the fine tuning adjustment screw by rotating it counter-clockwise 3 full turns.

(C). Connect VTVM to Point F as in steps 4, 5, and 6. Attenuate the sweep generator output so as to maintain a one volt reading on the VTVM.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8		Connect as shown in Fig 4.	207MC (10MC Sweep)	205.25MC	12	Vert. Amp. shunted by 1000MMF thru 10KΩ to Point (F). Low side to B-.	A14	Adjust A14 so marker appears at 50% amplitude position on pattern as per Fig 5. Do not attempt to shape pattern with this adjustment.
9		"	213MC (10MC Sweep)	211.25MC	13	"		Adjust fine tuning screw for channel #13 and note whether scope pattern can be centered on the horizontal trace line. If channel 13 cannot be tuned in, return to channel 12 and set fine tuning screw for channel 12 at 3 1/2 turns instead of 3 turns as originally specified. Recheck to see that channel 13 can now be received. Check 211.25MC marker at 50% amplitude position.
10		"	207MC (10MC Sweep)	205.25MC	12	"	A15, A16	Adjust A15 and A16 for properly shaped overall response pattern as per Fig 5. If video marker (205.25MC) is not at 50% amplitude position, change setting of A14 until pattern shifts in the desired direction. When adjusting A15 and A16, it is possible to broaden the bandpass by sacrificing amplitude. Do not overly broaden bandpass as this would result in loss of sensitivity.
11		"	213MC (10MC Sweep)	211.25MC	13	"		Check bandpass of channels 7, 8, 9, 10, 11 & 13 without disturbing high band trimmers. Adjust the sweep and marker generators for each channel as listed and adjust the fine tuning screws so each channel setting is correct. If one or two channels have a peaked response pattern, it is desirable the peak occurr on the sound carrier side rather than the picture carrier side. A compromise on the peak magnitude may be made by returning to channel 12 and lowering the response on the side of the characteristic curve which tends to rise when the tuner was previously set to lower channels.
			201MC (10MC Sweep)	199.25MC	11			
			195MC (10MC Sweep)	193.25MC	10			
			189MC (10MC Sweep)	187.25MC	9			
			183MC (10MC Sweep)	181.25MC	8			
			177MC (10MC Sweep)	175.25MC	7			

FIG. 1

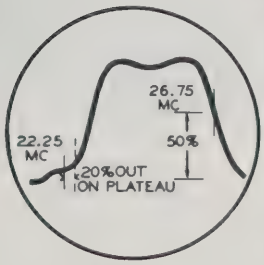
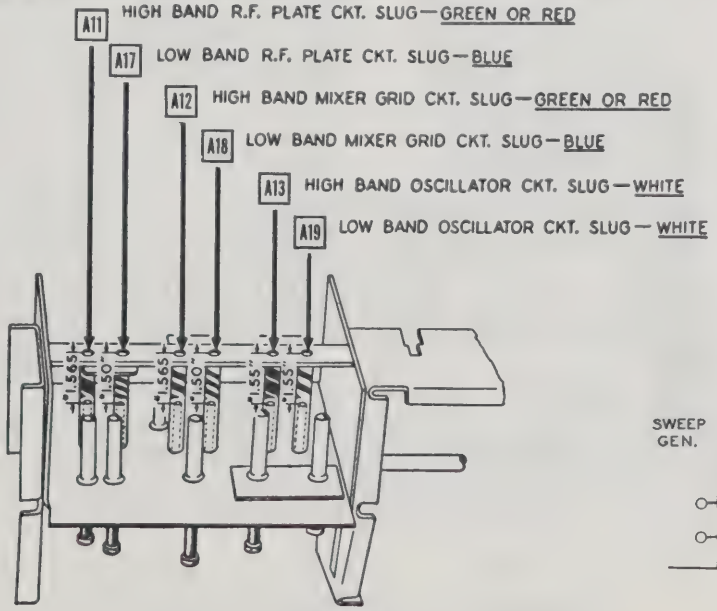


FIG. 2


A11 HIGH BAND R.F. PLATE CKT. SLUG—GREEN OR RED
A17 LOW BAND R.F. PLATE CKT. SLUG—BLUE
A12 HIGH BAND MIXER GRID CKT. SLUG—GREEN OR RED
A18 LOW BAND MIXER GRID CKT. SLUG—BLUE
A13 HIGH BAND OSCILLATOR CKT. SLUG—WHITE
A19 LOW BAND OSCILLATOR CKT. SLUG—WHITE
1.565"
1.50"
1.565"
1.50"
1.55"
1.55"
FIG. 3

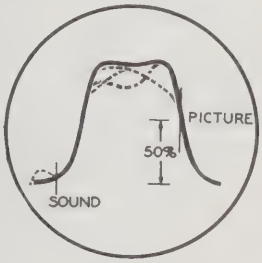


FIG. 5

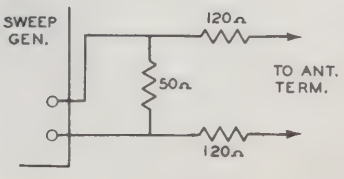


FIG. 4

ALIGNMENT INSTRUCTIONS (CONT.)

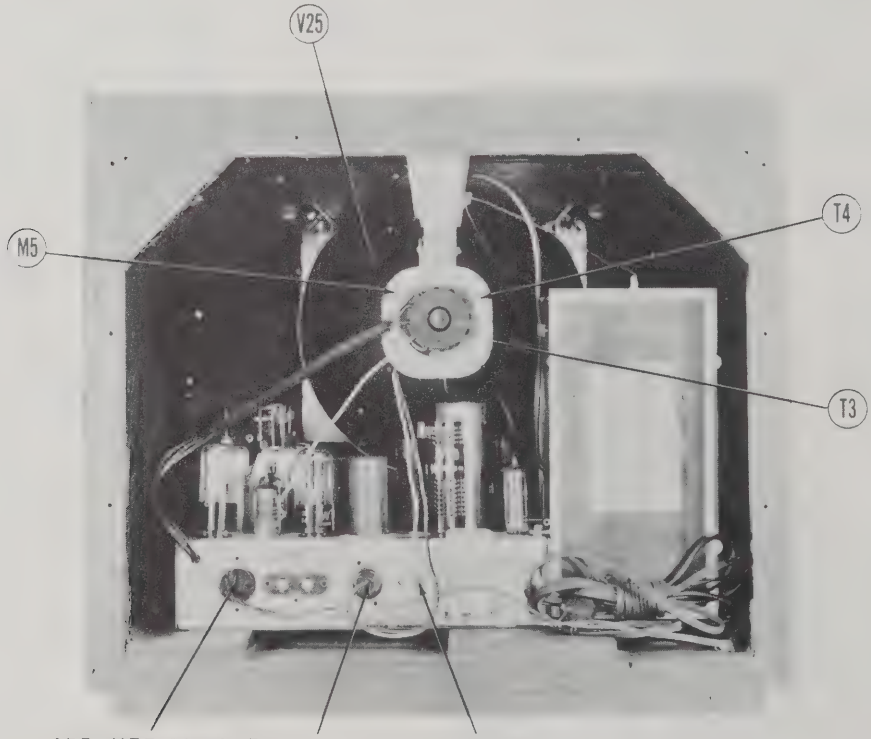
LOW BAND ALIGNMENT

(A). After positioning the slugs mechanically as in paragraph "C" under RF Channel Alignment Instructions, turn the channel selector switch to channel #6.

(B). Turn the fine tuning adjustment screw for channel 6 clockwise until the tuner actuating plate has been moved back as far as it will go and presses against its mechanical stop-DO NOT FORCE SCREW BEYOND THIS POINT. Now, back off this fine tuning screw by rotating it counter-clockwise one full turn.

(C). Connect VTVM to Point F as in steps 4, 5, and 6. Attenuate the sweep generator output so as to maintain a one volt reading on VTVM.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12		Connect as shown in Fig 4.	85MC (10MC Sweep)	83.25MC	6	Vert. Amp. shunted by 1000MMF thru 10KΩ to Point (F) Low side to B-.	A20	Adjust A20 so marker appears at 50% amplitude position on pattern as per Fig 5. Do not attempt to shape pattern with this adjustment.
13		"	57MC (10MC Sweep)	55.25MC	2	"		Adjust fine tuning screw for channel 2 and note whether scope pattern can be centered on the horizontal base line. If channel 2 cannot be tuned in, return to channel 6 and set fine tuning screw for channel 6 at 3/4 of a turn instead of 1 full turn as originally specified. Recheck to see that channel 2 can now be received. Check 55.25MC marker at 50% amplitude position.
14		"	85MC (10MC Sweep)	83.25MC	6	"	A21, A22	Adjust A21 & A22 for properly shaped overall response pattern as per Fig 5. If video marker (83.25MC) is not at 50% amplitude position, change setting of A20 until pattern shifts in the desired direction. When adjusting A21 and A22, it is possible to broaden the bandpass by sacrificing amplitude. Do not overly broaden the bandpass as this would result in loss of sensitivity.
15		"	79MC (10MC Sweep)	77.25MC	5	"		Check bandpass of channels 2,3,4,& 5 without disturbing low band trimmers. Adjust the sweep and marker generators for each channel as listed and adjust the fine tuning screws so each channel setting is correct. If one or two channels have a peaked response pattern, it is desirable the peak occurr on the sound carrier side rather than the picture carrier side. A compromise on the peak magnitude may be made by returning to channel 6 and lowering the response on the side of the characteristic curve which tends to rise when the tuner was previously set to lower channels.
			69MC (10MC Sweep)	67.25MC	4			
			63MC (10MC Sweep)	61.25MC	3			
			57MC (10MC Sweep)	55.25MC	2			



CABINET-REAR VIEW

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BH6	-.2VDC	.5VDC	93VAC	98VAC	125VDC	125VDC	0V		
V 2	6J6	120VDC	80VDC	105VAC	98VAC	§-.5VDC	0V	2VDC		
V 3	12AU6	-.3VDC	.4VDC	38VAC	50VAC	115VDC	115VDC	.4VDC		
V 4	12AU6	0V	.6VDC	50VAC	62VAC	115VDC	115VDC	.6VDC		
V 5	12AU6	0V	.6VDC	62VAC	75VAC	115VDC	115VDC	.6VDC		
V 6	12AU6	0V	.6VDC	75VAC	67VAC	115VDC	115VDC	.6VDC		
V 7	12AL5	0V	-2.2VDC	18VAC	6.5VAC	0V	0V	-2.2VDC		
V 8	12AU6	0V	0V	18VAC	30VAC	115VDC	120VDC	2.9VDC		
V 9	12AU7	95VDC	0V	2VDC	45VAC	30VAC	125VDC	1.8VDC	65VDC	38VAC
V 10	12AU6	-.9VDC	0V	100VAC	87VAC	115VDC	115VDC	0V		
V 11	19T8	-.4VDC	-.7VDC	-.4VDC	6.5VAC	25VAC	-.5VDC	0V	-.4VDC	41VDC
V 12	50L6GT	0V	0V	95VDC	125VDC	0V	0V	50VAC	8.8VDC	
V 13	12AU6	0V	4.5VDC	25VAC	38VAC	90VDC	125VDC	4.5VDC		
V 14	12SN7GT	-27VDC	70VDC 128VDC	3VDC	0V	75VDC	3VDC	30VAC	18VAC	
V 15	50L6GT	0V	93VAC	125VDC	125VDC	-16VDC	125VDC	45VAC	4VDC 19VDC	
V 16	12SN7GT	-1VDC	100VDC	2VDC	-2.3VDC	40VDC	0V	6.5VAC	18VAC	
V 17	50B5	-12VDC	0V	55VAC	0V	125VDC	95VDC 120VDC	-12VDC		
V 18	50B5	-12VDC	0V	98VAC	55VAC	125VDC	95VDC 120VDC	-12VDC		
V 19	50B5	-12VDC	0V	50VAC	98VAC	125VDC	95VDC 120VDC	-12VDC		
V 20	35Z5GT	0V	65VAC	55VAC	125VDC	50VDC	0V	30VAC	125VDC	
V 21	35Z5GT	0V	98VAC	90VAC	80VDC	128VDC	0V	65VAC	225VDC	
V 22	35L6GT	0V	65VAC	125VDC	65VDC	-36VDC	0V	100VAC	0V	
V 23	35L6GT	0V	30VAC	125VDC	65VDC	-36VDC	-32VDC	65VAC	0V	
V 24	1B3GT	DO NOT MEASURE								
V 25	10BP4	6.5VAC	0V	PIN 10 225VDC	PIN 11 65VDC	PIN 12 0V				

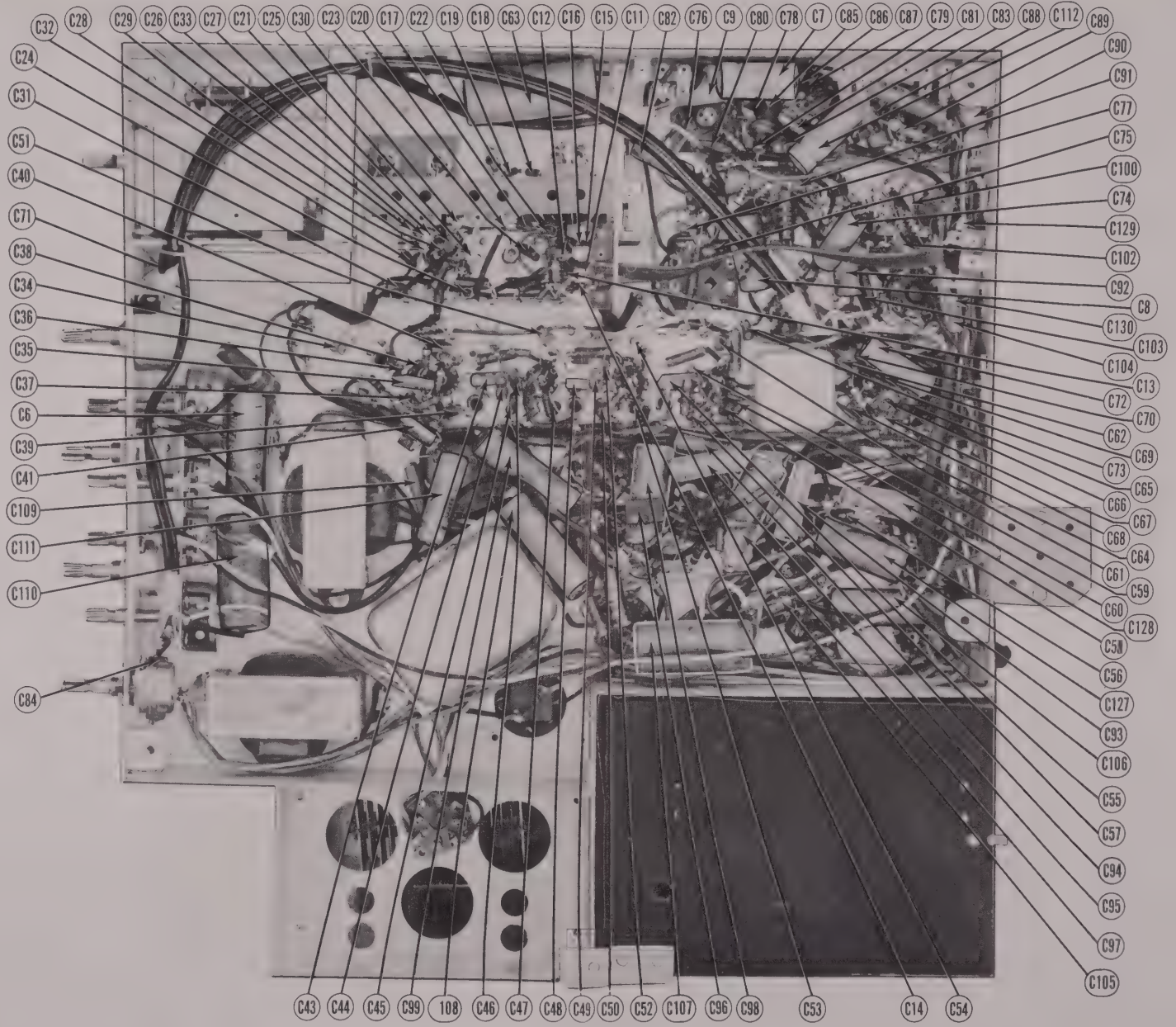
§ Taken with vacuum tube voltmeter.

RESISTANCE READINGS

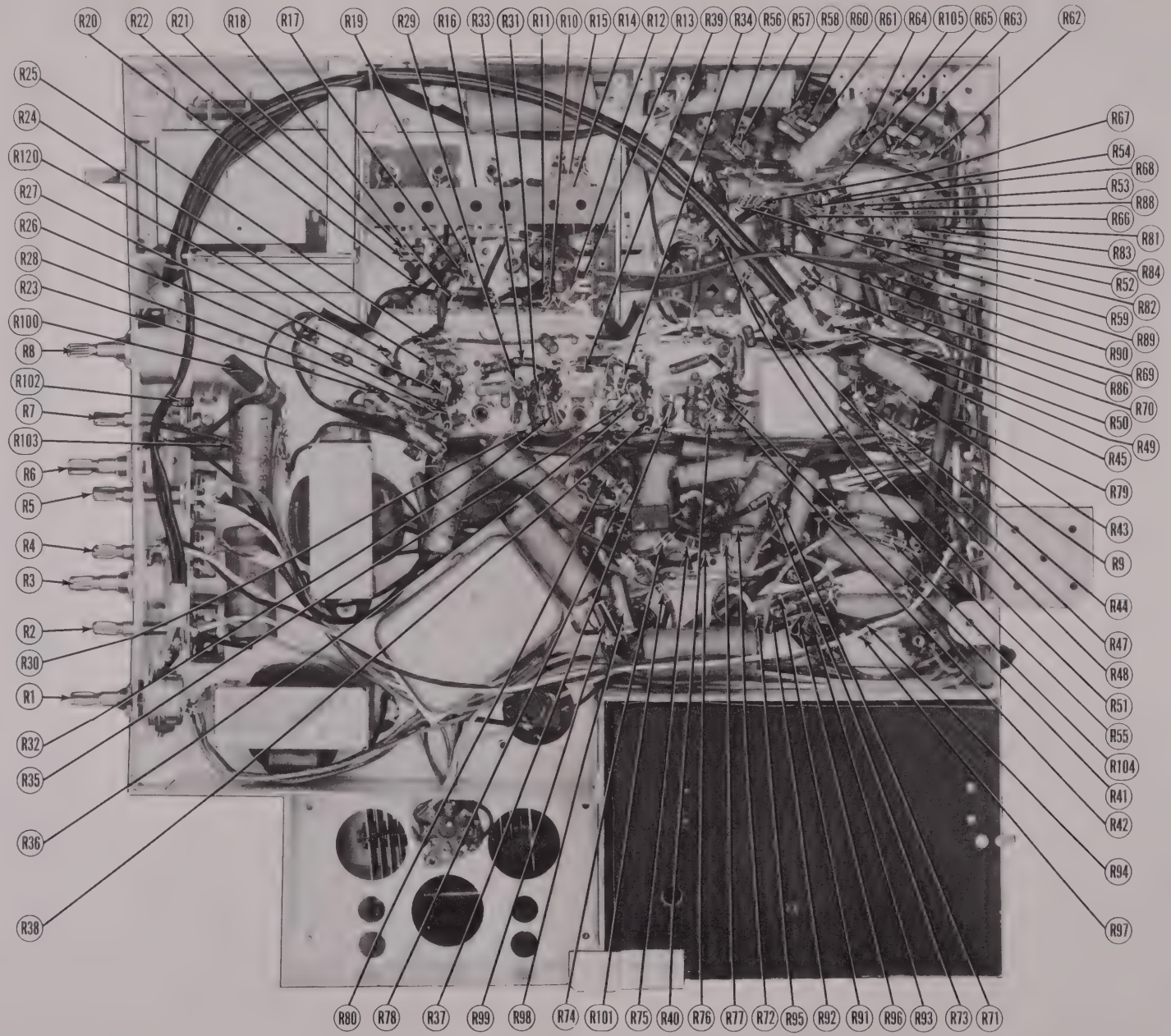
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BH6	200KΩ	68Ω	130Ω	125Ω	*11Ω	*1000Ω	5.6KΩ		
V 2	6J6	*1000Ω	*6KΩ	120Ω	125Ω	10KΩ	10KΩ	220Ω		
V 3	12AU6	160KΩ	6.5KΩ	150Ω	150Ω	*1000Ω	*1000Ω	82Ω		
V 4	12AU6	10KΩ	5.6KΩ	150Ω	150Ω	*1000Ω	*1000Ω	82Ω		
V 5	12AU6	6KΩ	5.6KΩ	150Ω	145Ω	*1000Ω	*1000Ω	82Ω		
V 6	12AU6	8Ω	5.6KΩ	140Ω	135Ω	*1000Ω	*1000Ω	68Ω		
V 7	12AL5	4.5Ω	47KΩ	145Ω	140Ω	68Ω	Inf.	8.2KΩ		
V 8	12AU6	1 Meg.	0Ω	150Ω	150Ω	*8.5KΩ	*10KΩ	2KΩ		
V 9	12AU7	*4.5KΩ	18KΩ	270Ω	150Ω	150Ω	*10Ω	1 Meg.	12KΩ	150Ω
V 10	12AU6	470KΩ	0Ω	120Ω	130Ω	*1000Ω	*1000Ω	0Ω		
V 11	19T8	1 Meg.	33KΩ	1 Meg.	140Ω	150Ω	33KΩ	0Ω	10 Meg.	*470KΩ
V 12	50L6GT	Inf.	0Ω	*800Ω	*10Ω	470KΩ	450KΩ	35Ω	180Ω	
V 13	12AU6	1 Meg.	22KΩ	150Ω	150Ω	*220KΩ	*10Ω	22KΩ		
V 14	12SN7GT	600KΩ	‡700KΩ ‡150KΩ	1000Ω	10KΩ	‡100KΩ	1000Ω	140Ω	145Ω	
V 15	50L6GT	Inf.	130Ω	*100Ω	*100Ω	1 Meg.	50KΩ	150Ω	2.3KΩ 330Ω	
V 16	12SN7GT	650KΩ	*3.8KΩ	270Ω	4 Meg.	*220KΩ	0Ω	145Ω	145Ω	
V 17	50B5	100KΩ	0Ω	35Ω	0Ω	*40Ω	*2.3KΩ *120Ω	100KΩ		
V 18	50B5	100KΩ	0Ω	46Ω	35Ω	*40Ω	*2.3KΩ *120Ω	100KΩ		
V 19	50B5	100KΩ	0Ω	35Ω	46Ω	*40Ω	*2.3KΩ *120Ω	100KΩ		
V 20	35Z5GT	Inf.	145Ω	145Ω	*10Ω	*650Ω	*400Ω	140Ω	*40Ω	
V 21	35Z5GT	Inf.	125Ω	130Ω	*450Ω	*13Ω	0Ω	145Ω	‡0Ω	
V 22	35L6GT	Inf.	150Ω	*42Ω	*3KΩ	10KΩ	Inf.	150Ω	0Ω	
V 23	35L6GT	Inf.	140Ω	*42Ω	*3KΩ	10KΩ	10KΩ	150Ω	0Ω	
V 24	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP 120KΩ
V 25	10BP4	140Ω	1 Meg.	PIN 10 ‡0Ω	PIN 11 12KΩ	PIN 12 0Ω				

* Measured from junction of M2 and L1
‡ Measured from pin 8 of V21

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	NOTES
		STEW. WARN. PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6BH6	6BH6	7CM	
V2	Converter	6J6	6J6	7BF	
V3	1st IF Amp.	12AU6	12AU6	7BK	
V4	2nd IF Amp.	12AU6	12AU6	7BK	
V5	3rd IF Amp.	12AU6	12AU6	7BK	
V6	4th. IF Amp.	12AU6	12AU6	7BK	
V7	DET.-AGC	12AL5	12AL5		
V8	Video Amp.	12AU6	12AU6	7BK	
V9	DC Rest. Cath. Follower-Horiz. Mult.	12AU7	12AU7	9A	
V10	Limiter	12AU6	12AU6	7BK	
V11	Ratio Det.-AF Amp.	19T8	19T8		
V12	Audio Output	50L6GT	50L6GT	7AC	
V13	Sync. Clipper	12AU6	12AU6	7BK	
V14	Vert. Mult.	12SN7GT	12SN7GT	8BD	
V15	Vert. Output	50L6GT	50L6GT	7AC	
V16	Hor. Mult.-Hor. Amp.	12SN7GT	12SN7GT	8BD	
V17	Horiz. Output	50B5	50B5	7BZ	
V18	Horiz. Output	50B5	50B5	7BZ	
V19	Horiz. Output	50B5	50B5	7BZ	
V20	Damper	35Z5GT	35Z5GT	6AD	
V21	Booster Rect.	35Z5GT	35Z5GT	6AD	
V22	HV Osc.	35L6GT	35L6GT	7AC	
V23	HV Osc.	35L6GT	35L6GT	7AC	
V24	HV Rect.	1B3GT	1B3GT	3C	
V25A	Picture Tube	10BP4	10BP4	12D	Used in model AVT1
B	Picture Tube	10FP4	10FP4	12D	Used in models AVC1 and AVC2.

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	STW. WARN. PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	
C1A	200	150	507319	AFH4040D	UP1LBJ			D14906	Filter
B	200	150			1055				"
C2A	200	150	507318	AFH4040D	UP1LBJ			D14906	"
B	200	150			1055				"
C3A	40	150	506798	AFH844D	UP4CJ			ELS-13	■ Filter
B	20	150			1056				▲ Decoupling
C	20	150							Decoupling
C4	500	3	507322	PRS6/500	BRH-605			UHC-506	Video Amp. Cath. Bypass
C5A	150	25	507359	AF888D*	UP4BJ			D14904	Vert. Output Cath. Bypass
B	50	25		PRS25/50	1059				Output Cath. Bypass
C6	8	300	507386	PRS350/8	BR835			UT-83	Filter
C7	10	25	502286	PRS25/10	BR102A			TVA-5	Stabilizing Cap.
C8	10	25	502286	PRS25/10	BR102A			TVA-5	Sync. Clipper Cath. Byp.
C9	10	150	505174	PRS150/12	BR1015			UT-121	Dyn. Limiter Cap.
C10	5		513432						Fixed Trimmer ±10% Note 2
C11	220		513018			GP2K-250			RF Coupling
C12	220		513018			GP2K-250			" "
C13	.001		513009			GP2L-001			RF Bypass
C14	.001		513009			GP2L-001			" "
C15	.001		513009			GP2L-001			RF Screen Bypass
C16	.001		513009			GP2L-001			RF Supp. Bypass
C17	1		513000						RF Coupling
C18	.5		513019						" "
C19	.5		513019						" "
C20	.001		513009			GP2L-001			RF Plate Decoupling
C21	.001		513009			GP2L-001			RF Bypass
C22	220		513018			GP2K-250			RF Fil. Bypass
C23	220		513018			GP2K-250			" " "
C24	.001		513009			GP2L-001			RF Bypass
C25	10		513437			NP0K-10			Conv. Cath. Bypass
C26	7		513402						Fixed Trimmer
C27	51		513416			N750L-47			Fixed Padder
C28	51		513416			N750L-47			Osc. Feedback
C29	2.2		513001						Osc. Coupling
C30	2.5		513436						Osc. Feedback
C31	.001		513009			GP2L-001			RF Bypass
C32	220		513018			GP2K-250			Conv. Fil. Bypass
C33	220		513018			GP2K-250			Conv. Fil. Bypass
C34	.001		513009			GP2L-001			Conv. Plate Decoup.
C35	47	500	512526	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	IF Coupling
C36	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	AGC Filter
C37	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	RF Bypass
C38	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	1st V. IF Supp. Byp.
C39	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	1st V. IF Decoupling
C40	100		513003	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	1st V. IF Fil. Bypass
C41	240	500		1469-00025	5R5T25		MOS.5-325	MS-325	Fixed Trimmer
C42	47		513438	1469-00005	5R5Q5	NP0M-50	MOS.5-45	MS-45	" "
C43	47	500	512526	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	IF Coupling
C44	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	AGC Filter
C45	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	RF Bypass
C46	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	2nd V. IF Supp. Bypass
C47	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	2nd V. IF Decoupling
C48	47	500	512526	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	IF Coupling
C49	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	AGC Filter
C50	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	RF Bypass
C51	100		513003	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	2nd V. IF Fil. Bypass
C52	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	3rd V. IF Supp. Bypass
C53	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	3rd V. IF Decoupling
C54	100		513003	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	3rd V. IF Fil. Bypass
C55	47	500	512526	1468-00005	5W5Q5	GP1K-47	MO.5-45	1FM-45	IF Coupling
C56	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	RF Bypass
C57	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	RF Bypass
C58	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	4th V. IF Cath. Bypass
C59	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	4th V. IF Supp. Bypass

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (CONT.)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA STEW. WARN. PART No.	AEROVOX PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C60	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	TFM-21	4th V. IF Decoupling
C61	100		513003	1468-0001	5W5T1	GP1K-100	MO.5-31	TFM-31	4th V. IF Fil. Bypass
C62	100		513003	1468-0001	5W5T1	GP1K-100	MO.5-31	TFM-31	IF Coupling
C63	1.0	200	512086	484-1.0	GT2W1		ST-2-1M	TC-10	AGC Filter
C64	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	TFM-21	" "
C65	.01	200	512008	P488-01	GT2S1	GP2-335-01	ST-2-01	TM-11	AGC Diode Filter
C66	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	TFM-21	" "
C67	.5		513432	1469-0000005	5R5V5	NP0K-5	MO3.5-55	YS-55	Diode Filter
C68	.005		513013	1467-005	1D5D5	GP2M-005	MW.5-25	TFM-25	RF Bypass Note 4
C69	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	TFM-21	DET-AGC Fil. Bypass
C70	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	TFM-21	DET-AGC Fil. Bypass
C71	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	TFM-21	RF Bypass
C72	.05	200	512026	P288-05	GT2S5		ST-4-05	TM-15	Video Coupling
C73	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	TFM-21	RF Bypass "
C74	.05	200	512026	P288-05	GT2S5		ST-4-05	TM-15	Video Coupling
C75	47		513433	1469-00005	5R5Q5	NP0M-50	MO3.5-45	YS-45	S. IF Coupling ± 10%
C76	.0018		513010	1467-0015	1W5D15	GP2L-0015	MW.5-215	TFM-215	Limiter Decoupling
C77	220		513419	1469-00005	5W5T5	GP2K-250	MO.5-325	TFM-325	Limiter Fil. Bypass Note 2
C78	.001		513009	1468-001	1W5D1	GP2L-001	MW.5-21	TFM-21	IF Coupling
C79	500	500	513009	1468-0001	5W5T1	GP2K-500	MO.5-32	TFM-32	Diode Load Cap.
C80	500	500	512513	1468-0005	5W5T5	GP2K-500	MO.5-35	TFM-35	De-emphasis
C81	.0018		513010	1467-0015	1W5D15	GP2L-0015	MW.5-215	TFM-215	RF Bypass
C82	.01	200	512008	P288-01	GT2S1	GP2-335-01	ST-4-01	TM-11	" "
C83	.05	200	512026	P288-05	GT2S5		ST-4-05	TM-15	Phono Isolation
C84	.01	200	512008	P288-01	GT2S1	GP2-335-01	ST-4-01	TM-11	Vol. Cont. Isolation
C85	.1	600	512032	P288-1	GT2S2		ST-4-1	TM-12	" "
C86	.002	600	512003	P288-002	GT2D2	JF2M-002	ST-6-002	TM-22	Audio Coupling
C87	500	500	512513	1468-0005	5W5T5	JF2K-500	MO.5-35	TFM-35	RF Bypass
C88	500	500	512513	1468-0005	5W5T5	JF2K-500	MO.5-35	TFM-35	AF Plate Bypass
C89	.01	400	512008	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Audio Coupling
C90	.0015		513010	1467-0015	1W5D15	GP2L-0015	MW.5-215	TFM-215	Tone Compensation
C91	.01	600	512000	P688-001	GT6D1		ST-6-001	TM-21	Output Plate Bypass
C92	.05	200	512026	P288-05	GT6S5		ST-4-05	TM-15	Video Coupling
C93	.05	200	512026	P288-05	GT6S5		ST-4-05	TM-15	Sync. Coupling
C94	.001	600	512006	P688-005	GT6D5	GP2M-005	ST-6-005	TM-25	Integrator Net.
C95	.01	200	512008	P288-01	GT2S1	GP2-335-01	ST-4-01	TM-11	" "
C96	.01	400	512303	P488-01	4T4S1	JP2-335-01	ST-4-01	TM-11	Vert. Mult. Feedback
C97	500	500	512513	1468-0005	5W5T5	JP2K-500	MO.5-35	TFM-35	Vert. Mult. Plate Byp.
C98	.2	400	512302	P488-22	3T4P2		ST-4-2	68P36	Vert. Discharge
C99	.2	400	512304	P488-22	3T4P2		ST-4-2	68P36	Vert. Coupling
C100	.25	200	512044	P488-25	GT2P25		ST-2-25	TC-2	Fixed Trimmer
C101	470	500	513528	1468-0005	5W5T5	GP2K-500	MO.5-35	TFM-35	Differentiator Net.
C102	56		513015	1468-00005	5W5J5	GP1K-50	MO.5-45	TFM-45	Hor. Mult. Feedback
C103	47		513420	1468-00005	5W5J5	GP1K-50	MO.5-45	TFM-45	Hor. Discharge Note 3
C104	500	500	512513	1468-0005	5W5T5	GP2K-500	MO.5-35	TFM-35	Hor. Coupling
C105	.01	200	512008	P488-01	GT2S1	GP2-335-01	ST-4-01	TM-11	" "
C106	150		513004	1468-00015	5W5T15	GP2K-150	MO.5-315	TFM-315	Hor. Output Grid Filter Note 2
C107	.25	200	512044	P488-25	GT2P25		ST-2-25	TC-2	Hor. Output Screen Byp.
C108	.5	200	512051	P288-2	GT2P5		ST-2-5	TC-5	Damper Filter
C109	.25	200	512045	P488-25	GT2P25		ST-2-25	TC-2	Hor. Coupling
C110	330	1000	512064						Fixed Trimmer
C111	.5	200	512051	P288-5	GT2P5		ST-2-5	TC-5	Filter
C112	.1	200	512032	P288-1	GT2P1		ST-2-1	TM-1	RF Bypass
C113	.1	200	512032	P288-1	GT2P1		ST-2-1	TM-1	Pic. Tube Grid Filter
C114	.01	200	512008	P488-01	GT2S1		ST-4-01	TM-11	HV Osc. Grid Cap.
C115	.1	200	512032	P288-1	GT2P1		ST-2-1	TM-1	Bias Filter
C116	.02	200	512014	P488-02	GT2S2		ST-4-02	TM-12	" "
C117	.01	200	512009	P488-01	GT2S1		ST-4-01	TM-11	HV Osc. Feedback
C118	.02	200	512015	P488-02	GT2S2		ST-4-02	TM-12	HV Osc. Screen Byp.
C119	.02	200	512015	P488-02	GT2S2		ST-4-02	TM-12	HV Osc. Plate Dec.
C120	.02	200	512014	P488-02	GT2S2		ST-4-02	TM-12	RF Bypass
C121	500	1000	513021						Fixed Trimmer Note 1
C122	500	1000	513021						HV Filter
C123	.1	200	512033	P288-1	GT2P1		ST-2-1	TM-1	Line Isolation
C124	.1	200	512032	P288-1	GT2P1		ST-2-1	TM-1	" "
C125	.02	200	512014	P488-02	GT2S2		ST-4-02	TM-12	HV Osc. Fil. Bypass
C126	.02	200	512014	P488-02	GT2S2		ST-4-02	TM-12	" " " "
C127	.05	600	512030	P688-05	GT6S5		ST-6-05	TM-15	Line Isolation
C128	.01	400	512010	P488-01	GT4S1		ST-4-01	TM-11	Line Filter
C129	220		512518	1468-0002	5W5T2	GP2K-200	MO.5-32	TFM-32	Ant. Coupling
C130	220		513018	1468-0002	5W5T2	GP2K-200	MO.5-32	TFM-32	" "

Note 1. Some models use 430MMF in this application.
Note 2. Not used in all models.
Note 3. Some models use 82MMF in this application.
Note 4. Some models use 1000MMF in this application.
* Parallel sections to obtain desired capacity.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA STEW.-WARN. PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	½	507294	D13-137	AM-63-Z	Volume control See Note 1
B	Shaft		Not Req.	E	KSS-3	Attach to R1A Per Instructions
C	Switch		Not Req.	41	SW-A	" " " "
R2	2000Ω	2	507296	W-2000#	43-2000#	Width Control
R3A	250KΩ	½	507298	D11-130	AM-55-S	Horiz. Hold Control
B	Shaft		Not Req.	E	KSS-3	Attach to R3A Per Instructions
R4	500KΩ	½	507296		15/16-58-S	Vert. Hold Control
R5	500KΩ	½	507296		15/16-58-S	Height Control
R6A	50KΩ	½	507295	D11-123	AM-44-S	Brightness Control
B	Shaft		Not Req.	E	KSS-3	Attach to R6A Per Instructions
R7	10KΩ	4	507297	W-10K#	43-10K#	Focus Control
R8	2000Ω	2	507296			Contrast Control
R9	2000Ω	2	507304	W-2000#	43-2000#	Vert. Linearity Control

Note 1. Use original insulating washers and lug sleeve to isolate control from chassis.
File slot in shaft for screw driver.

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA STEW. WARN. PART No.	IRC PART No.	IDENTIFICATION CODES All resistors are ± 10% unless otherwise stated
R10	10MΩ	½	510172		RF Grid
R11	0Ω	½	510115		RF Cathode
R12	5600Ω	½	510150	BTS-5600	RF Suppressor
R13	10000Ω	½	510137	BTS-1000	RF Screen Decoupling 20%
R14	5600Ω	½	510150		RF Coil Shunt
R15	5600Ω	½	510150	BTS-5600	RF Plate Decoupling
R16	10KΩ	½	510154		Mixer Coil Shunt
R17	10KΩ	½	510154		Mixer Grid
R18	220Ω	½	510124		Mixer Cathode
R19	10KΩ	½	510154		Osc. Grid
R20	5600	½	510150	BTS-5600	Osc. Plate
R21	10Ω	½	510100		Parasitic Suppressor
R22	10Ω	½	510100		" "
R23	10000Ω	½	510137	BTS-1000	Mixer Plate Decoupling 20%
R24	5600Ω	½	510150		1st IF Grid
R25	10000Ω	½	510137	BTS-1000	AGC Network 20%
R26	82Ω	½	510117		1st IF Cathode
R27	5600Ω	½	510150	BTS-5600	1st IF Suppressor
R28	10000Ω	½	510137	BTS-1000	1st IF Decoupling
R29	82000Ω	½	510153	BTS-8200	2nd IF Grid
R30	82Ω	½	510117		2nd IF Cathode
R31	5600Ω	½	510150	BTS-5600	2nd IF Suppressor
R32	10000Ω	½	510137	BTS-1000	2nd IF Plate Decoupling 20%
R33	10000Ω	½	510137	BTS-1000	AGC Network
R34	5600Ω	½	510150		3rd IF Grid
R35	82Ω	½	510117		3rd IF Cathode
R36	5600Ω	½	510150	BTS-5600	3rd IF Suppressor
R37	82000Ω	½	510153	BTS-8200	3rd IF Coil Shunt
R38	10000Ω	½	510137	BTS-1000	3rd IF Plate Decoupling 20%
R39	10000Ω	½	510137	BTS-1000	AGC Network 20%
R40	68Ω	½	510115		4th IF Cathode
R41	5600Ω	½	510150	BTS-5600	4th IF Suppressor
R42	10000Ω	½	510137	BTS-1000	4th IF Plate Decoupling 20%
R43	100KΩ	½	510173	BTS-100K	AGC Network
R44	47KΩ	½	510166	BTS-47K	AGC Diode Load
R45	68Ω	½	510115		AGC Cathode
R46	82KΩ	½	510171	BTS-82K	Voltage Divider See Note 1
R47	82000Ω	½	510153	BTS-8200	Video Det. Load
R48	100Ω	½	510119		Parasitic Suppressor
R49	1 Meg.	½	510191	BTS-1 Meg.	Video Amp. Grid
R50	120Ω	½	510120		Video Amp. Cathode
R51	10KΩ	½	510156	BTS-10K	Video Amp. Screen Decoupling
R52	8200Ω	1	510253	BTA-8200	Video Amp. Plate
R53	1 Meg.	½	510191	BTS-1 Meg.	DC Restorer Grid 20%
R54	12KΩ	½	510156	BTS-12K	Cathode Follower Load
R55	470KΩ	½	510185	BTS-470K	Limiter Grid 20%
R56	1000Ω	½	510137	BTS-1000	Limiter Decoupling 20%
R57	10KΩ	½	510156	BTS-10K	De-emphasis
R58	10 Meg.	½	510197	BTS-10 Meg.	AF Grid 20%
R59	33KΩ	½	510163	BTS-33K	Dynamic Limiter Load
R60	33KΩ	½	510163	BTS-33K	Ratio Det. Load
R61	470KΩ	½	510185	BTS-470K	AF Plate 20%
R62	22KΩ	½	510160	BTS-22K	Tone Compensation
R63	470KΩ	½	510185	BTS-470K	Output Grid 20%
R64	180Ω	1	510223	8w-1-180	Output Cathode
R65	10KΩ	½	510155	BTS-10K	Phase Correction 20%
R66	1 Meg.	½	510191	BTS-1 Meg.	Sync. Clipper Grid 20%
R67	270Ω	½	510126		Sync. Clipper Cathode
R68	22KΩ	½	510160	BTS-22K-5%	" " 5%
R69	220KΩ	½	510179	BTS-220K	Sync. Clipper Plate 20%
R70	180KΩ	½	510177	BTS-180K	Phase Correction
R71	4700Ω	½	510149	BTS-4700	Integrator
R72	4700Ω	½	510149	BTS-4700	Integrator
R73	1000Ω	½	510137	BTS-1000	Vert. Multi. Cathode 20%
R74	100KΩ	½	510173	BTS-100K	Vert. Multi. Plate 20%
R75	390KΩ	½	510719	BTS-390K	Vert. Multi. Grid See Note 7 5%
R76	150KΩ	½	510176	BTS-150K	Vert. Multi. Plate 20%
R77	2200Ω	½	510143	BTS-2200	Vert. Peaking 20%
R78	1 Meg.	½	510191	BTS-1 Meg.	Vert. Output Grid 20%
R79	330Ω	½	510128	BTA-330	Vert. Output Cathode
R80	18KΩ	½	510159	BTS-18K	Vert. Output Trans. Shunt
R81	470Ω	½	510130	BTS-470	Voltage Divider
R82	330Ω	½	510127	BTA-330	Voltage Divider See Note 5
R83	18KΩ	½	510159	BTS-18K	Horiz. Multi. Grid
R84	270Ω	½	510126		Horiz. Multi. Cathode
R85	1800Ω	½	510141	BTS-1800	Horiz. Multi. Plate See Note 6
R86	2200Ω	½	510143	BTS-2200	Horiz. Multi. Decoupling
R87	560KΩ	½	510186	BTS-560K	Horiz. Multi. Grid See Note 4
R88	220KΩ	½	510178	BTS-220K	Grid Current Limiting See Note 3
R89	3.9 Meg.	½	510714	BTS-3.9 Meg.	Horiz. Amp. Grid
R90	220KΩ	½	510178	BTS-220K	Horiz. Amp. Plate See Note 2
R91	100KΩ	½	510173	BTS-100K	Bias Network 20%
R92	100Ω	½	510119		Parasitic Suppressor 20%
R93	100Ω	½	510119		" " 20%
R94	100Ω	½	510119		" " 20%
R95	100Ω	½	510119		" " 20%
R96	100Ω	½	510119		" " 20%
R97	100Ω	½	510119		" " 20%
R98	220Ω	5	510716	AB-225	Damper Filter
R99	47Ω	1	510213	BW-2-47	" "
R100	560Ω	2	510332	BW-2-560	Focus Coil Shunt
R101	470KΩ	½	510185	BTS-470K	Filter 20%
R102	56KΩ	½	510168	BTS-56K	Voltage Divider
R103	1 Meg.	½	510191	BTS-1 Meg.	Picture Tube Grid 20%
R104	150KΩ	½	510176	BTS-150K	Line Isolation 20%
R105	560Ω	2	510332	BW-2-560	Filter
R106	1500Ω	½	510139	BTS-1500	HV Osc. Grid
R107	8200Ω	½	510153	BTS-8200	" "
R108	10KΩ	½	510155	BTS-10K	Filter
R109	100Ω	½	510119		Parasitic Suppressor 20%
R110	100Ω	½	510119		" " 20%
R111	100KΩ	½	510173	BTS-100K	HV Osc. Feedback Network
R112	10Ω	½	510101		Parasitic Suppressor 20%
R113	100Ω	½	510119		" " 20%
R114	10Ω	½	510101		" " 20%
R115	100Ω	½	510119		" " 20%
R116	30000Ω	2	510713	BW-2-3300	HV Osc. Sereen Dropping 5%

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA STEW. WARN. PART No.	IRC PART No.	IDENTIFICATION CODES	
R117	470KΩ	½	510185		HV Filter	20%
R118	220KΩ	½	510179	BTS-220K	Isolation	20%
R119	220KΩ	½	510179	BTS-220K	" "	20%
R120	10KΩ	½	510155	BTS-10K	1st IF Trans. Shunt See Note 8	

Note 1. Item 46 82KΩ resistor not used in chassis "W".
Note 2. Uncoded chassis uses 33KΩ in this application IRC replacement BTS-33K.
Note 3. Uncoded chassis uses 120KΩ in this application IRC replacement BTS-120K.
Note 4. Uncoded chassis uses 470KΩ in this application IRC replacement BTS-470K.
Note 5. Uncoded chassis uses 180Ω in this application.
Note 6. Uncoded chassis uses 33KΩ in this application IRC replacement BTS-33K.
Note 7. Uncoded chassis uses 470KΩ in this application IRC replacement BTS-470K-5%.
Note 8. Used in chassis "W" only.

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING DC RESISTANCE SEC.	REPLACEMENT DATA STEW. WARN. PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	NOTES
T1	342 Tap. @ 42		507293				Hor. Output Chk. Coil
T2	97Ω	6.3Ω	507312				Vert. Output Trans.
T3A	132		506805	DY-1			Hor. Deflection Yoke
B	68Ω						Vert. Deflection Yoke
T4	560Ω		506804	FC-10			Focus Coil

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA STEW. WARN. PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T5	22	424Ω	0Ω		507285			

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA STEWART WARNER PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	◊ INSTALLATION NOTES
T6A	2600Ω	3.6Ω	200Ω	.6Ω	507212	A-3876*	RC-2*	A-2928*	* Bend mounting tabs down and mount on original bracket ◊ Used with speaker Part # 507111.
B					507209 ◊				

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE (@ CURRENT 1000 cps)	REPLACEMENT DATA STEWART WARNER PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	INSTALLATION NOTES
L1	.390A	9.4Ω	.7 Henries	507313				

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA STEWART WARNER PART No.	MEISSNER PART No.	NOTES
L2	Ant. Input	0Ω		507497		
L3	Inductor	0Ω				Straight piece of #18 tinned wire
L4	Inductor	0Ω				" " " " " "
L5	RF Choke	.2Ω		507496		
L6	RF Choke	.2Ω		507496		
L7	RF Plate }	0Ω		507474		Coil Assy.-RF Plate Coils for high & low
L8	RF Plate }					band, includes M3A switch sections, less
L9	RF Choke	.2Ω		507496		slugs.
L10	Mixer Grid }	0Ω		507498		Coil Assy.-Mixer Grid Coils for high and
L11	Mixer Grid }					low band includes M3B switch sections,less
L12	RF Choke	.2Ω		507496		slugs
L13	RF Choke	.2Ω		507496		
L14	Osc. Coil }	0Ω		507499		Coil Assy.-Osc. coils for high and low band
L15	Osc. Coil }					includes M3C switch sections, less slugs
L16	RF Choke	1.2Ω		507372		Not used on uncoded chassis
L17	1st Video IF	.2Ω		507343		Less slug
L18	RF Choke	1.2Ω		507372		
L19	Absorption Trap Coil	0Ω				Used on series W only
L20A	2nd Video IF	0Ω		507343		Used on series W only less slug
B	2nd Video IF	0Ω		507377		Not used on series W
L21	RF Choke	1.2Ω		507372		
L22	3rd Video IF	.2Ω		507343		Less slug
L23	RF Choke	1.2Ω		507372		
L24	4th Video IF	.2Ω		507343		Less slug
L25	RF Choke	6.5Ω		507367		
L26	RF Choke	1.2Ω		507372		
L27A	5th Video IF	.2Ω		507344		Less slug
B	RF Choke	3Ω		507344		
L28	RF Choke	1.2Ω		507372		
L29	Peaking	5.5Ω		507376		Wound on 3.3KΩ resistor
L30	Peaking	32Ω		507375		Wound on 47KΩ resistor
L31	Peaking	23Ω		507374		
L32	1st Sound IF	2.8Ω	1.5Ω	507384		

STEWART-WARNER
MODELS AVC1, AVC2, AVT1

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA STEW. WARN. PART No.	REPLACEMENT DATA MEISSNER PART No.	NOTES
L33	Sound Disc. Transformer	4Ω	.2Ω	507321		
L34	RF Choke	15Ω		507373		
L35	RF Choke	24Ω		507371		
L36	RF Choke	20Ω		507379		
L37	Horiz.Sync.	80Ω		507440		Not used on uncoded chassis, less slug
L38	Fil.Choke	.5Ω		507378		
L39	Fil.Choke	.5Ω		507378		
L40	Fil.Choke	1.2Ω		507372		Not used on uncoded chassis
L41	Fil.Choke	1.2Ω		507372		
L42	Fil.Choke	1.2Ω		507372		
L43	Fil.Choke	1.2Ω		507372		
L44	Fil.Choke	1.2Ω		507372		

SPEAKER

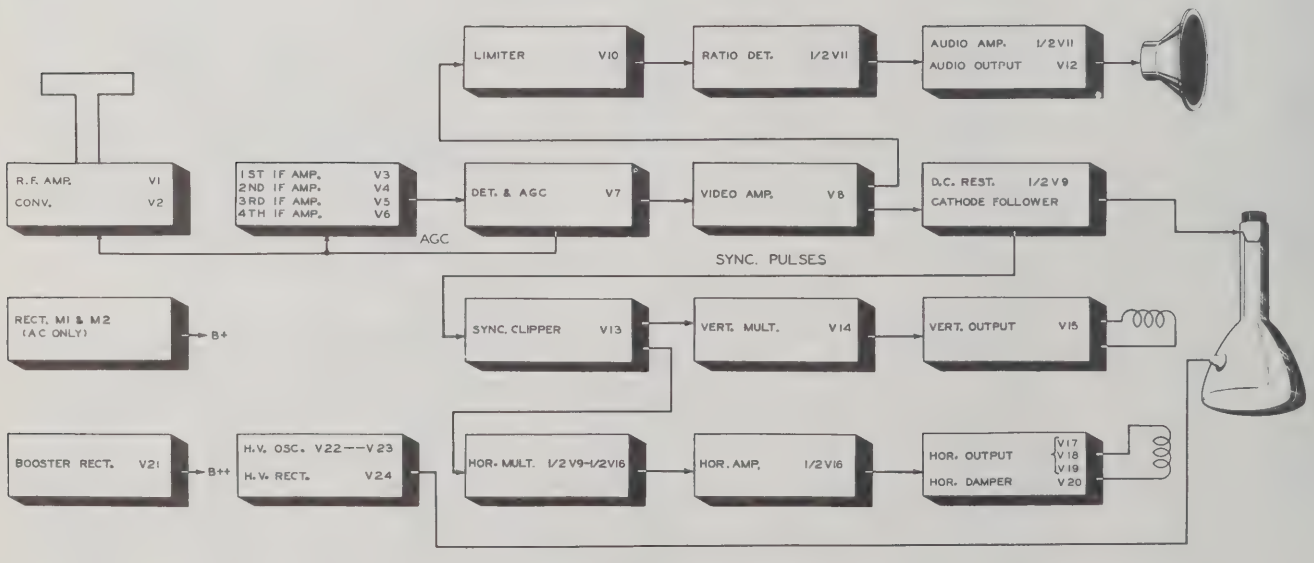
ITEM No.	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA STEWART WARNER PART No.	REPLACEMENT DATA JENSEN PART No.	REPLACEMENT DATA QUAM PART No.	INSTALLATION NOTES
SP1A	PM	3.6Ω	506806	ST-107	5A15#	# Remount output transformer.
B	PM		507111‡	MOD.P5-V#		‡ Used in models AVC1 and AVC2.
	CONE DIA.	V. C. DIA.				
SP2A	4 9/16"	9"				
B	6" x 9"					

SELENIUM RECTIFIER

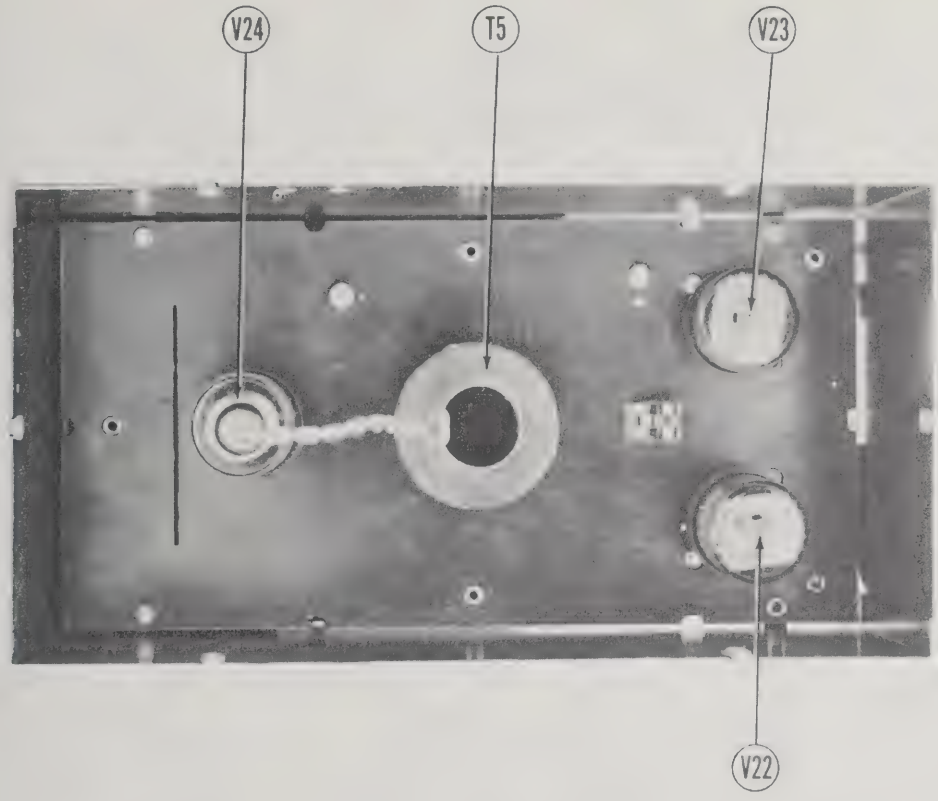
ITEM No.	RATING CURRENT	REPLACEMENT DATA STEW. WARN. PART No.			NOTES
M1	.215A	507301			
M2	.215A	507301			

MISCELLANEOUS

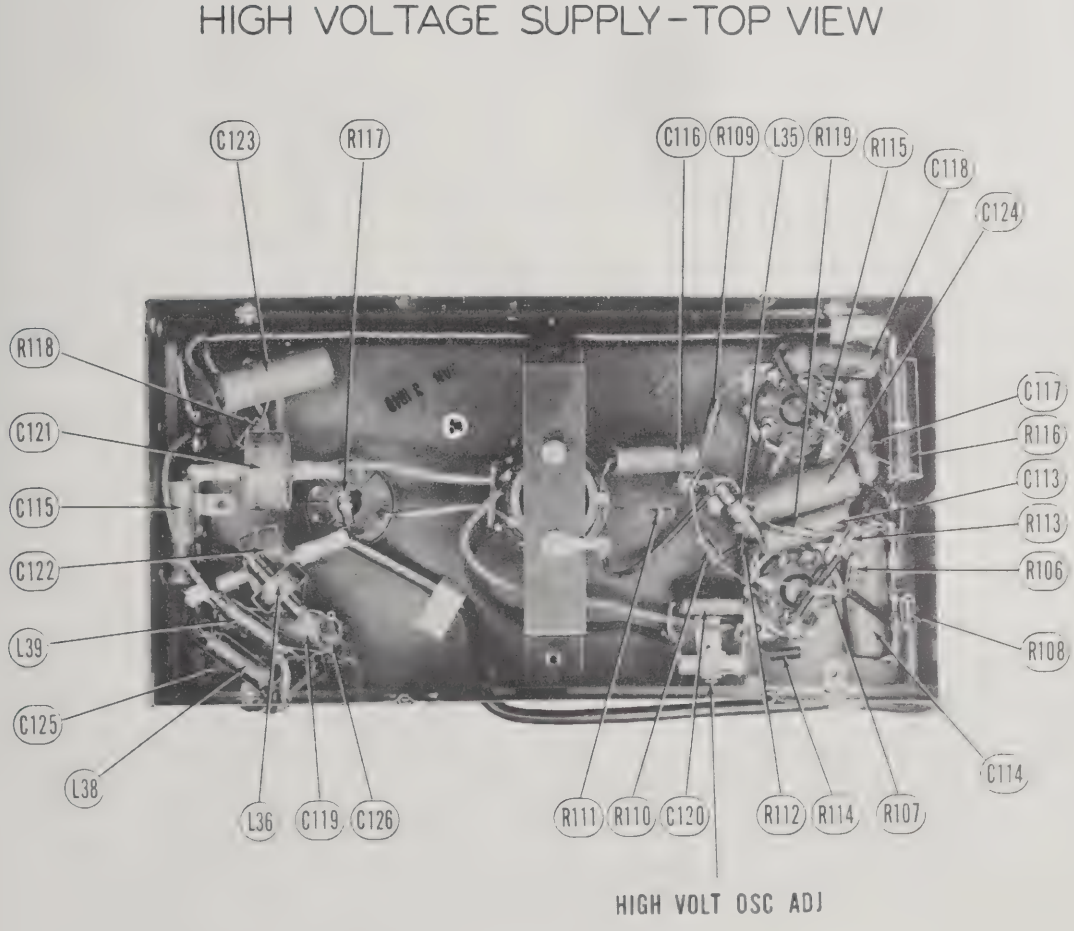
ITEM No.	PART NAME	STEW. WARN. PART No.	NOTES
M3A	Channel Selector		High & Low Band, Part of RF Plate Coil Assembly, L7,8
B	Switch		High & Low Band, Part of Mixer Grid Coil Assembly L10-11
C			High and Low Band, Part of Osc. Coil Assy. L14, 15.
M4	Ballast Tube	507300	
M5	Ion Trap	506803	PM Type Used on Model AVT-1 Only.
M6	Polarizing Relay		For use on direct current.
	Knob	506904	Channel Selector
	Knob	506913	For any control except channel selector
	Socket & Cable Assy.	507338	Picture tube
	Socket	507288	Speaker
	Terminal Strip		Antenna connections
	Slug core	507357	For video IF coils, or sound IF coils
	Slug core	507486	For high band RF plate, or mixer grid coil(end painted green or red)
	Slug Core	507487	For low band RF plate or mixer grid coils (end painted blue)
	Slug Core	507488	For high or low band Osc. coil (end painted white)
	Slug Core	507429	For Horiz. Sync. Coil.



BLOCK DIAGRAM



HIGH VOLTAGE SUPPLY - TOP VIEW



HIGH VOLTAGE SUPPLY - BOTTOM VIEW

PRODUCTION CHANGES

The schematic on page 2 conforms to the series "W" chassis. These chassis were coded in reverse alphabetical sequence; that is, series "Z", series Y, etc. This code is stamped on the back surface of the chassis. It should be remembered that the series "W" is a later type than those listed below.

Following is a listing of changes made in each series from the initial production up to the series "W" chassis.

UNCODED: Initial production.

SERIES Z:
1. C120 changed from 430MMF to 560MMF.
2. C105 added in parallel with R91.
3. R90 changed from 33KΩ to 220KΩ.
4. R88 changed from 120KΩ to 220KΩ.
5. C102 changed from 82MMF to 47MMF.
6. R87 changed from 470KΩ to 560KΩ.
7. R82 changed from 180Ω to 330Ω.
8. R85 changed from 33KΩ to 1800Ω.
9. L37 with a 3300MMF capacitor in parallel were added in the plate circuit of V9B.
10. C68 changed from 1000MMF to 5000MMF.
11. L16 added in series with B+ to RF Amp. and Oscillator stages.
12. L40 added in series with filament supply line to V10 and V21.
13. C77 added from pin 3 of V10 to chassis.
14. R75 changed from 470KΩ to 390KΩ.
15. Center arm of vertical hold control connected to B- instead of pin 3 (cathode) of V14.

SERIES "Y"
1. Connection from B- to pin 2 of deflection yoke socket (on chassis) was removed. Pin 2 & 5 of this socket were then connected together to place vertical deflection coil at same DC potential as horizontal deflection coil.
2. C10 was removed from circuit. C10 was connected from pin 1 of V2 to chassis.
3. Selenium rectifiers M1 and M2 were removed from the chassis pan on Console models AVC1 and AVC2 and and mounted on a separate plate which is attached to the cabinet. A cable and plug connects rectifiers to socket on chassis.

SERIES "X"
1. Connection of low potential side of C73 in screen circuit of V8 was changed from B- to chassis.

SERIES "W"
1. Absorption trap not in L20. L19 and C41 added in cathode circuit of V3.
2. R120 added across 1st IF Transformer.
3. The grids of the 2nd and 3rd IF stages (V4 & V5) are returned to B- instead of the AGC line.
4. R46, which was connected from + 130 volt line to the high end of the contrast control, was removed. The low end of the cathode resistor (R45) of V7 was connected at the junction of R46 and the contrast control. This was moved to the B- line.

DISASSEMBLY INSTRUCTIONS
MODEL AVT I

1. Remove five push-on type control knobs.
2. Remove eight phillips head screws holding back cover. Remove back cover.
3. Remove picture tube socket, from picture tube.
4. Remove focus coil plug and speaker plug from chassis.
5. Remove isolation lead from HV chassis and remove HV lead from picture tube.
6. Remove four 9/32" hex head screws holding chassis. Remove chassis.
7. Remove deflection coil plug after chassis is part way out of cabinet.
8. Remove four 11/32" hex nuts holding speaker. Remove speaker.

REMOVAL OF PICTURE TUBE
MODEL AVT I

1. Remove chassis according to disassembly instructions.
2. Remove two hex nuts holding focus and deflection coils to cabinet.
3. Loosen two wing nuts holding clamp on front of picture tube. CAUTION: HOLD REAR OF PICTURE TUBE UP WHILE LOOSENING WING NUTS.
4. Remove picture tube out rear of cabinet.

HORIZONTAL FREQUENCY ADJUSTMENT

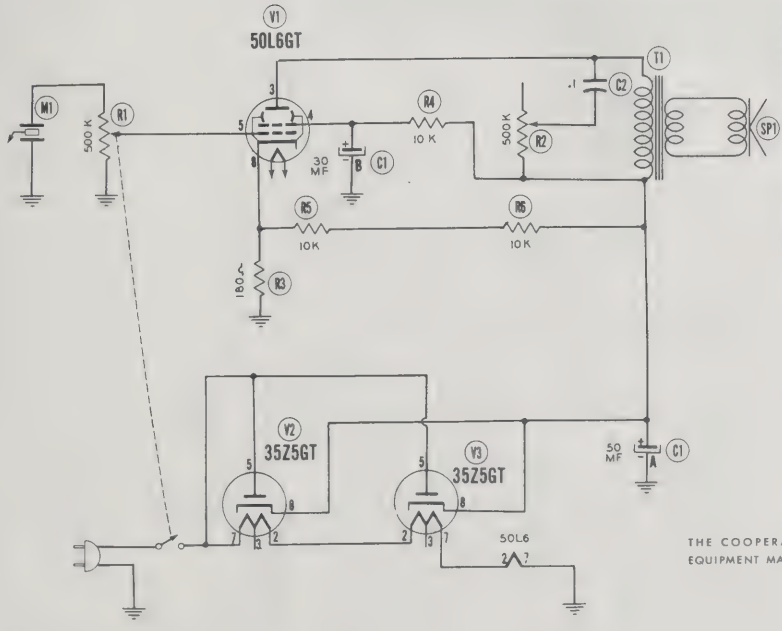
Set the horizontal hold control to center of its range. Turn contrast control slightly below normal.

Adjust slug B1 until picture "syncs" horizontally.

STEWART-WARNER

SUPREME MODEL 738LP

TRADE NAME	Supreme, Model 738LP
MANUFACTURER	Aim Industries, 41 Union Square, New York 3, N.Y.
TYPE SET	AC Operated Phono Player with 3 Tube Amplifier.
TUBES	(THREE) Types 50L6GT Power Output, (2) 35Z5GT Rectifier.
POWER SUPPLY	110-120 Volts AC RATING .25 Amp. @ 117 Volts AC



Pin No	50L6GT Volt	50L6GT Res	35Z5GT Volt	35Z5GT Res
1	0V	INF	0V	INF
2	35VAC	50Ω	80VAC	85Ω
3	145VDC	1210Ω	70VAC	90Ω
4	125VDC	10KΩ	0V	INF
5	0V	560KΩ	117VAC	130Ω
6	0V	INF	0V	INF
7	0V	0Ω	35VAC	50Ω
8	40VDC	180Ω	155VDC	18KΩ

Pin No	35Z5GT Volt.	Res.
1	0V	INF
2	80VAC	85Ω
3	70VAC	100Ω
4	0V	INF
5	117VAC	130Ω
6	0V	INF
7	117VAC	130Ω
8	155VDC	18KΩ

Measured from pin 8 of V3

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A PHOTOFACT STANDARD NOTATION SCHEMATIC

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4912-13

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SUPREME PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Power Output	50L6GT	50L6GT	7AC	
V2	Rectifier	35Z5GT	35Z5GT	6AD	
V3	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SUPREME PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	50	150		PRSA150/50	EDL5315		DSB-5030	TA-530	Filter Green
B	30	150		-30			-150		Filter Red
C2	.1	150		P286-1	GT2P1		ST-2-1	TM-1	Tone Conn.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SUPREME PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ	½		D13-133	M-60-Z	Volume Control
B	Shaft			A	Not Req.	Attach to R1A per instr.
C	Switch			41	SW-A	Attach to R1A per instr.
R2A	50UKΩ	½		D13-133	M-60-Z	Tone control
B	Shaft			A	Not Req.	Attach to R2A per instr.

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SUPREME PART No.	IRC PART No.	IDENTIFICATION CODES
R3	150Ω	½		BW-½-180	Output Cathode
4	10KΩ	1		BTA-10K	Filter
5	10KΩ	½		BTS-10K	Bias Voltage Divider
6	10KΩ	½		BTS-10K	Bias Voltage Divider

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: SUPREME PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	INSTALLATION NOTES
T1	5000Ω	3Ω	220Ω	.7Ω		A-3856	RO-9	A-2900	

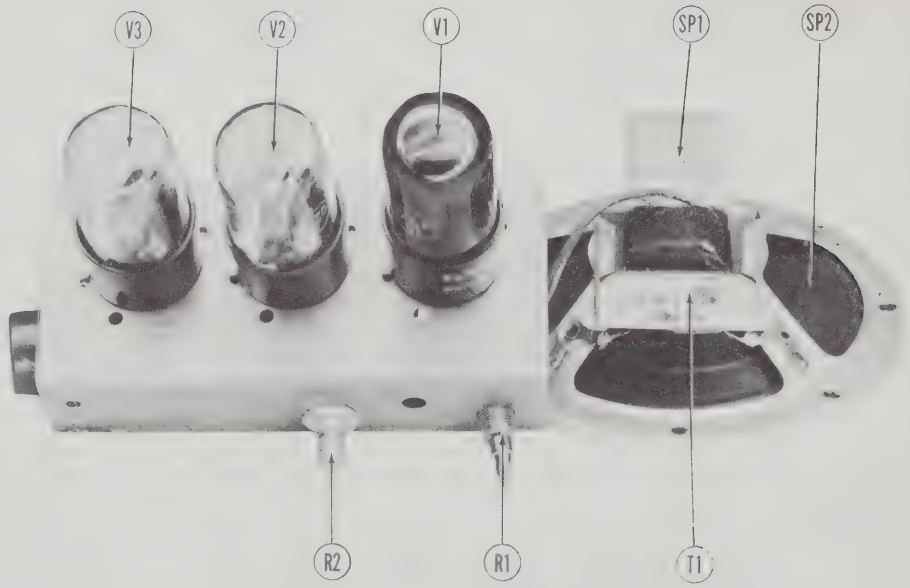
SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: SUPREME PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	V.C. IMP.				
SP1	PM	3Ω		ST-105 MOD.P5-X	5A07	
	CONE DIA.	V.C. DIA.				
SP2	4-5/8"	9/16"				

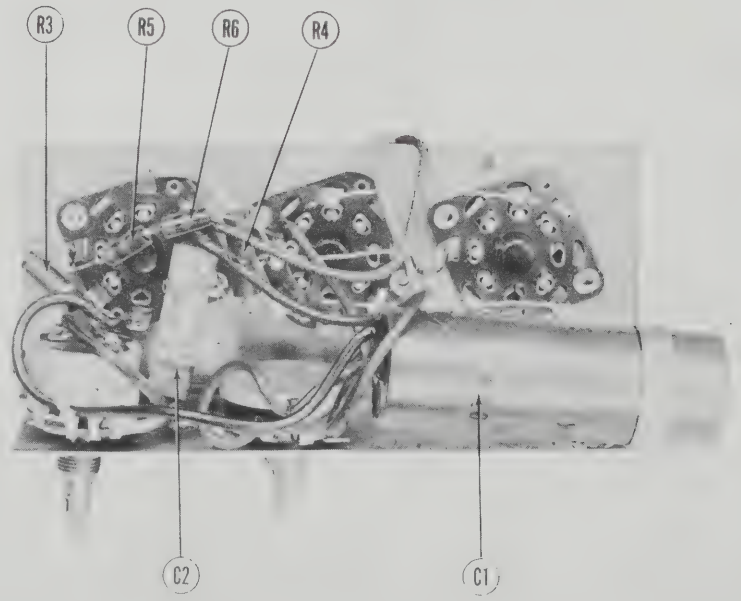
PHONO CARTRIDGE

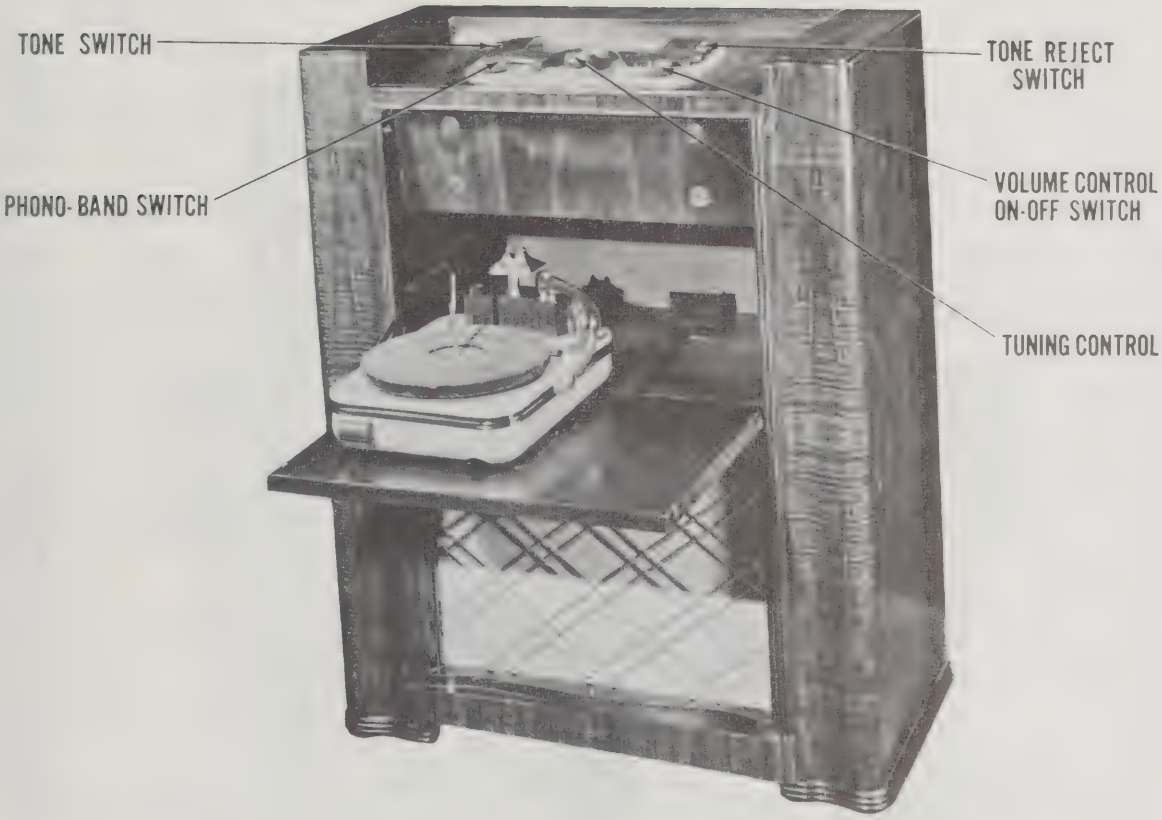
ITEM No.	REPLACEMENT DATA: SUPREME PART No.	ASTATIC PART No.	REMARKS
M1A		5J7	Arm
B		L92-33	Cartridge

CHASSIS—TOP VIEW



CHASSIS—BOTTOM VIEW





ZENITH
MODELS 9H984, 9H984LP

ZENITH
MODELS 9H984, 9H984LP

ZENITH MODEL 9H984LP

TRADE NAME	Zenith, Models 9H984, 9H984LP (Ch. 9F22)
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago 31, Illinois
TYPE SET	AC Operated Combination Phono-Radio, AM-FM Superheterodyne Receiver with Loop Antenna.
TUBES(NINE)	Types 6BA6 RF Amp., 6BE6 Converter, 6J5 Phono Osc., 6BA6 1st IF-Phono Amp., 6AU6 2nd IF Amp., 6AU6 3rd FM IF Amp., 6T8 DET-AVC-AF, 6K6GT Power Output, 5Y3GT Rectifier.
POWER SUPPLY	110-120 Volts AC RATING .72 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1620KC FREQ. MOD. 88-108MC

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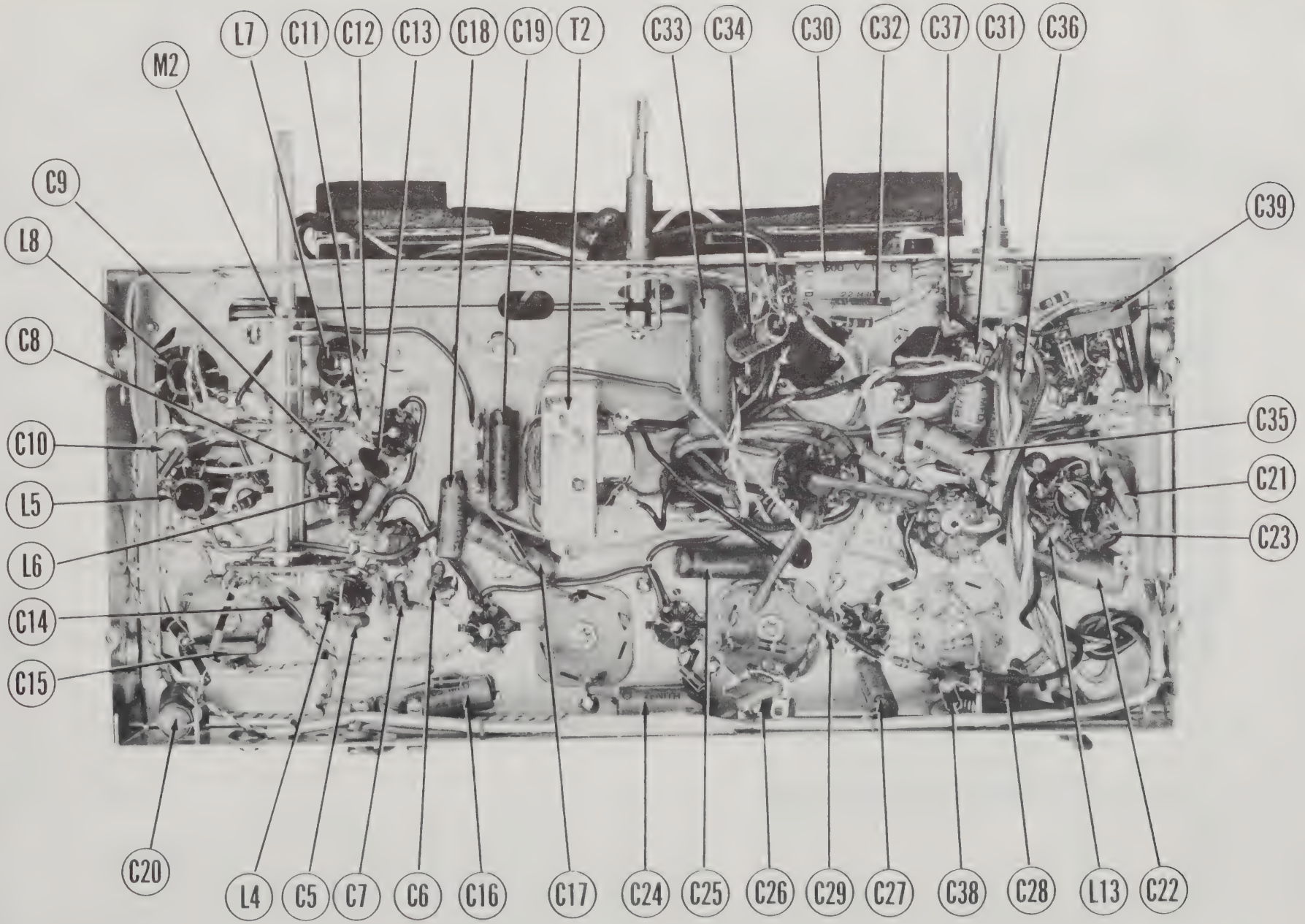
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C12
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C18
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R26
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R6
R8
R13
R12
R7
R11
R4
R10
R9

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		ZENITH PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6BA6	6BA6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	Phono Osc.	6J5	6J5	6Q	
V4	1st IF-Phono Amp.	6BA6	6BA6	7BK	
V5	2nd IF Amp.	6BA6	6BA6	7BK	
V6	3rd FM IF	6BA6	6BA6	7BK	
V7	DET-AVC-AF	6T8	6T8		
V8	Power Output	6K6GT	6K6GT	7S	
V9	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA ZENITH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	80	450	22-1885	AF88J†	UP8045		DY-314	TVL-18	▰Filter
B	40	25		PRS25/50	BR502				▲Output Cath. Bypass
C2A	40	450	22-1884	AF88J	UP4445		DY-2x40 -450	EL-240	▰Output Cath. Bypass
B	40	350							▲Output Cath. Bypass
C3	.05	200	22-829	P288-05	GT2S5		ST-4-05	TM-15	Ant. Coupling
C4	4.7		22-1516	1469-000005	5R5V5	NP0K-5	MOS.5-55	MS-55	Fixed Trimmer ±10%
C5	22		22-1506						Fixed Trimmer ±5%
C6	1000		22-1676	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	RF Screen Bypass
C7	30		22-1705	1468-00004	5W5Q3	GP1K-50	MO.5-43	1FM-44	RF Cath. Bypass
C8	100		22-1669	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	RF Plate Decoup.
C9	19		22-1688		5R5Q2	NP0K-20	MOS.5-42	MS-42	Fixed Trimmer ±5%
C10	.05	200	22-829	P288-05	GT2S5		ST-4-05	TM-15	AVC Filter
C11	50		22-1367	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Osc. Grid Cap
C12	48		22-1689	1469-00005	5R5Q5	NP0M-50	MOS.5-45	MS-45	Fixed Trimmer ±5%
C13	5000		22-1706	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Osc. Anode Bypass
C14	5000		22-1706	1467-005	1D5D5	GP2M-005	MW.5-25	1FM-25	Conv. Plate Decoup.
C15	1000	500	22-348	1468-001	1W5D1	GP2L-001	MW.5-21	1FM-21	AVC Filter
C16	.05	200	22-829	P288-05	GT2S5		ST-4-05	TM-15	1st IF Cath. Bypass
C17	.002	600	22-1220	P688-002	GT6D2	GP2M-002	ST-6-002	TM-22	1st IF Screen Bypass
C18	.01	200	22-1385	P488-01	GT2S1	GP2-335-01	ST-4-01	TM-11	1st IF Fil. Bypass
C19	.002	600	22-1220	P688-002	GT6D2	GP2M-002	ST-6-002	TM-22	Audio Coupling
C20	.02	600	22-830	P688-02	GT6S2		ST-6-02	TM-12	Phono Coupling
C21	47	500	22-1532	1468-00005	5W5Q5	GP1K-50	MO.5-45	1FM-45	Feedback
C22	.1	200	22-1418	P288-1	GT2P1		ST-2-1	TM-1	Phono Osc. Grid Cap
C23	50		22-1664	1469-00005	5R5V5	NP0M-50	MOS.5-45	MS-45	Osc. Coupling ±5%
C24	.05	200	22-829	P288-05	GT2S5		ST-4-05	TM-15	2nd IF Cath. Bypass
C25	.002	600	22-1220	P688-002	GT6D2	GP2M-002	ST-6-002	TM-22	2nd IF Decoupling
C26	100		22-1669	1468-0001	GW5T1	GP1K-100	MO.5-31	1FM-31	Diode Filter
C27	.01	200	22-1385	P488-01	GT2S1	GP2-335-01	ST-4-01	TM-11	3rd IF Screen Bypass
C28	.01	200	22-1385	P488-01	GT2S1	GP2-335-01	ST-4-01	TM-11	3rd IF Plate Decoup.
C29	25		22-1507	1468-000025	5W5Q25	GP1K-25	MO.5-425	MS-425	3rd IF Grid Filter
C30	.02	600	22-8300	P688-02	GT6S2		ST-6-02	TM-12	Audio Coupling
C31	.01	400	22-1718	P488-01	GT4S1	GP2-335-01	ST-4-01	TM-11	Audio Coupling Shielded
C32	100	500	22-1669	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	Tone Comp.
C33	.2	200	22-1531	P488-22	GT4P2		ST-4-2	68P18	Tone Comp.
C34	.001	200	22-1717	P688-001	GT6D1	GP2L-001	ST-6-002	TM-21	Tone Comp.
C35	.0005	600	22-854	1468-0005	GT6T5	GP2K-500	ST-6 -0005	TC-35	AF Plate Bypass
C36	.05	600	22-171	P688-05	GT6S5		ST-6-05	TM-15	Audio Coupling
C37	.01	600	22-1627	P688-01	GT6S1	GP2-335-01	ST-6-01	TM-11	Tone Comp.
C38	100		22-1669	1468-0001	5W5T1	GP1K-100	MO.5-31	1FM-31	FM Ant. Coupling
C39	.005	400	22-1041	P488-005	GT6D5	GP2M-005	ST-6-005	TM-25	Line Filter

† Parallel Sections To Obtain Desired Capacity.

PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA ZENITH PART No.	JENSEN PART No.	QUAM PART No	INSTALLATION NOTES
	FIELD	V.C. IMP.				
SP1	FM	3.2Ω	49-604	ST-103 MODEL P12-R*	12A6*	*Replace Output XFMR To Match 3-8Ω Voice Coil.
	CONE DIA.	V.C. DIA.				
SP2	11-3/4"	1"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA ZENITH PART No.	REPLACEMENT DATA MEISSNER PART No.	
L1	Loop Ant.	.5Ω		S-14305		
L2	Loop Loading Coil	3Ω		S-15396		
L3	FM Dipole Ant.	0Ω				
L4	FM Ant. Coil	0Ω	0Ω	S-14192		
L5	AM RF Coil	2.5Ω	10Ω	S-13974	14-1587	
L6	FM RF Coil	0Ω	0Ω	S-13871		
L7	FM Osc. Coil	0Ω		S-12259		
L8	AM Osc. Coil	9Ω		S-11157	14-1060	
L9A	FM 1st IF	.5Ω		S-13970		
B	AM 1st IF	8Ω	8.5Ω **			**Includes FM Pri. Winding
L10A	FM 2nd IF			S-13971		
B	AM 2nd IF	10Ω††	3Ω**			
L11A	FM 3rd IF		1Ω	S-13972		
B	AM 3rd IF	9Ω††	8Ω			††Includes FM Pri. Winding
L12	FM Disc. XFMR	.5Ω	.5Ω	S-14984		
L13	Phono Osc. Coil	2Ω		S-12603		

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA ZENITH PART No.		NOTES
M1	Bayonet	6-8V	0.25A	Blue	100-36		Type #44

MISCELLANEOUS

ITEM No.	PART NAME	PART No.	NOTES
M2	Switch	85-442	Band-Phono
M3	"	S-14261	Radiorgan
M4	Tuning Gang	22-1677	(24-410MMF, 16-215MMF, 18-92MMF)
	Dial Scale	S-15394	
	Dial Pointer	59-209	
	Dial Glass	192-114	

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	ZENITH PART No.	IRC PART No.	CLAROSTAT PART No.	
R1A	1 Meg	½	63-1588	D13-137	AM-63-Z	Volume Control
B	Shaft		Not Req.	E	KSS-3	Attach to R1A per instr.
C	Switch		Not Req.	41	SW-A	Attach to R1A per instr.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	PART No.	IRC PART No.	
R2	1 Meg	½	63-1912	BTS-1 Meg	AVC Network
R3	33KΩ	1	63-957	BTA-33K	RF Screen
R4	470Ω	½	63-1771	BTS-470	RF Plate
R5	68Ω	½	63-1737		RF Cathode
R6	22KΩ	½	63-1842	BTS-22K	Osc. Grid
R7	470Ω	½	63-1772	BTS-470	Osc. Grid
R8	15KΩ	1	63-1065	BTA-15K	Decoupling
R9	2200Ω	½	63-1800	BTS-2200	Decoupling
R10	220KΩ	½	63-1884	BTS-220K	AVC Network
R11	2.2 Meg	½	63-1926	BTS-2.2 Meg	AVC Network
R12	10KΩ	½	63-1827	BTS-10K	Tone Compensation
R13	33KΩ	½	63-1848	BTS-33K	Phono Osc. Plate
R14	8200Ω	½	63-1824	BTS-8200	Phono Osc. Plate
R15	1 Meg	½	63-1911	BTS-1 Meg	Phono Osc. Grid
R16	680Ω	½	63-1779	BTS-680	1st IF Decoupling
R17	68Ω	½	63-1737		1st IF Cathode
R18	68Ω	½	63-1737		2nd IF Cathode
R19	4700Ω	2	63-1998	BT-2-4700	2nd IF Decoupling
R20	4700Ω	1	63-943	BTA-4700	Voltage Dropping
R21	15KΩ	½	63-1834	BTS-15K	3rd FM IF Screen Decoupling
R22	12KΩ	½	63-1831	BTS-12K	3rd FM IF Plate Decoupling
R23	6800Ω	½	63-1820	BTS-6800	3rd FM IF Bleeder
R24	100KΩ	½	63-1870	BTS-100K	3rd FM IF Grid
R25	47KΩ	½	63-1856	BTS-47K	Diode Filter
R26	220KΩ	½	63-1884	BTS-220K	Diode Load
R27	150KΩ	½	63-1876	BTS-150K	Disc. Diode Load
R28	150KΩ	½	63-1876	BTS-150K	Disc. Diode Load
R29	68KΩ	½	63-1862	BTS-68K	Tone Compensation
R30	220KΩ	½	63-1883	BTS-220K	Deemphasis
R31	220KΩ	½	63-1883	BTS-220K	AF Plate Load
R32	15 Meg	½	63-1961	BTS-15 Meg	AF Grid
R33	680Ω	½	63-1778	BTS-680	Tone Compensation
R34	4700Ω	½	63-1813	BTS-4700	Tone Compensation
R35	1000Ω	½	63-1785	BTS-1000	Tone Compensation
R36	1500Ω	½	63-1792	BTS-1500	Tone Compensation
R37	470KΩ	½	63-1897	BTS-470K	Output Grid
R38	470Ω	1	63-1222	BTA-470	Output Cathode
R39	5600Ω	5	63-1817	BTS-5600	Tone Compensation
R40	1500Ω	5	63-1681	AB-1500	Filter
R41	1800Ω	2	63-1691	BT-2-1800	Filter

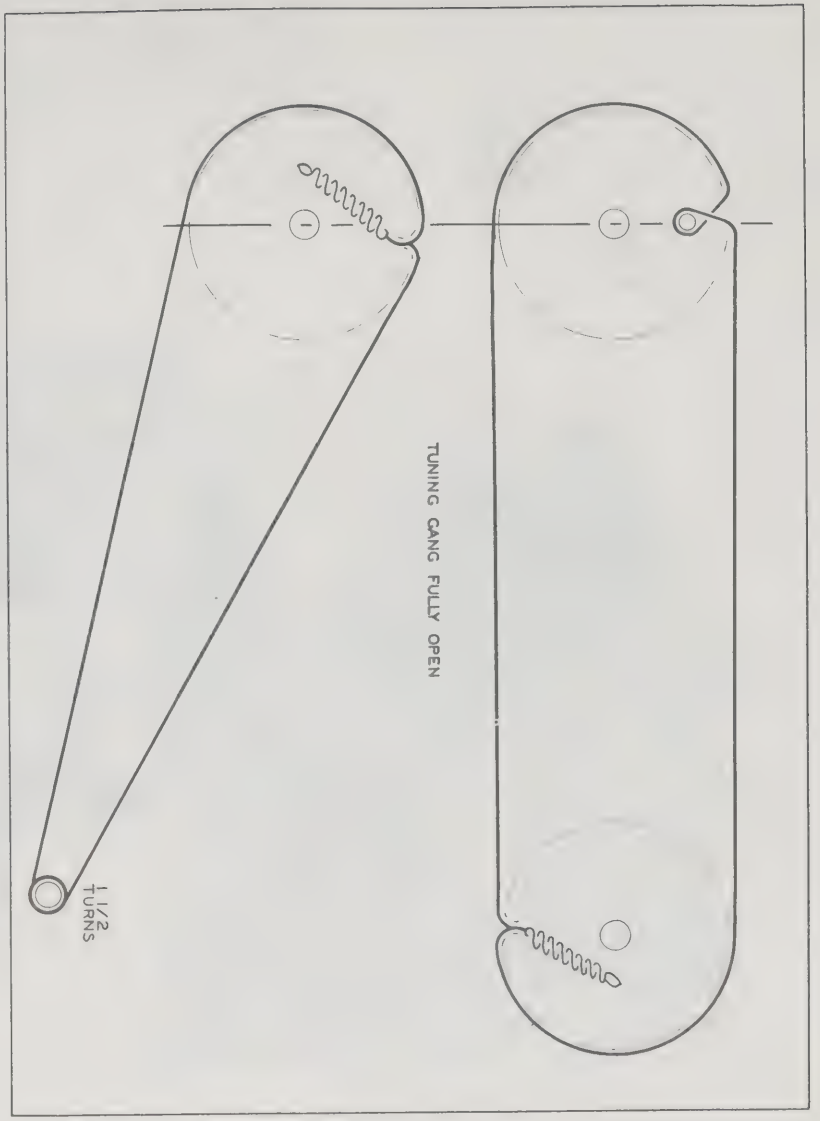
TRANSFORMER (POWER)

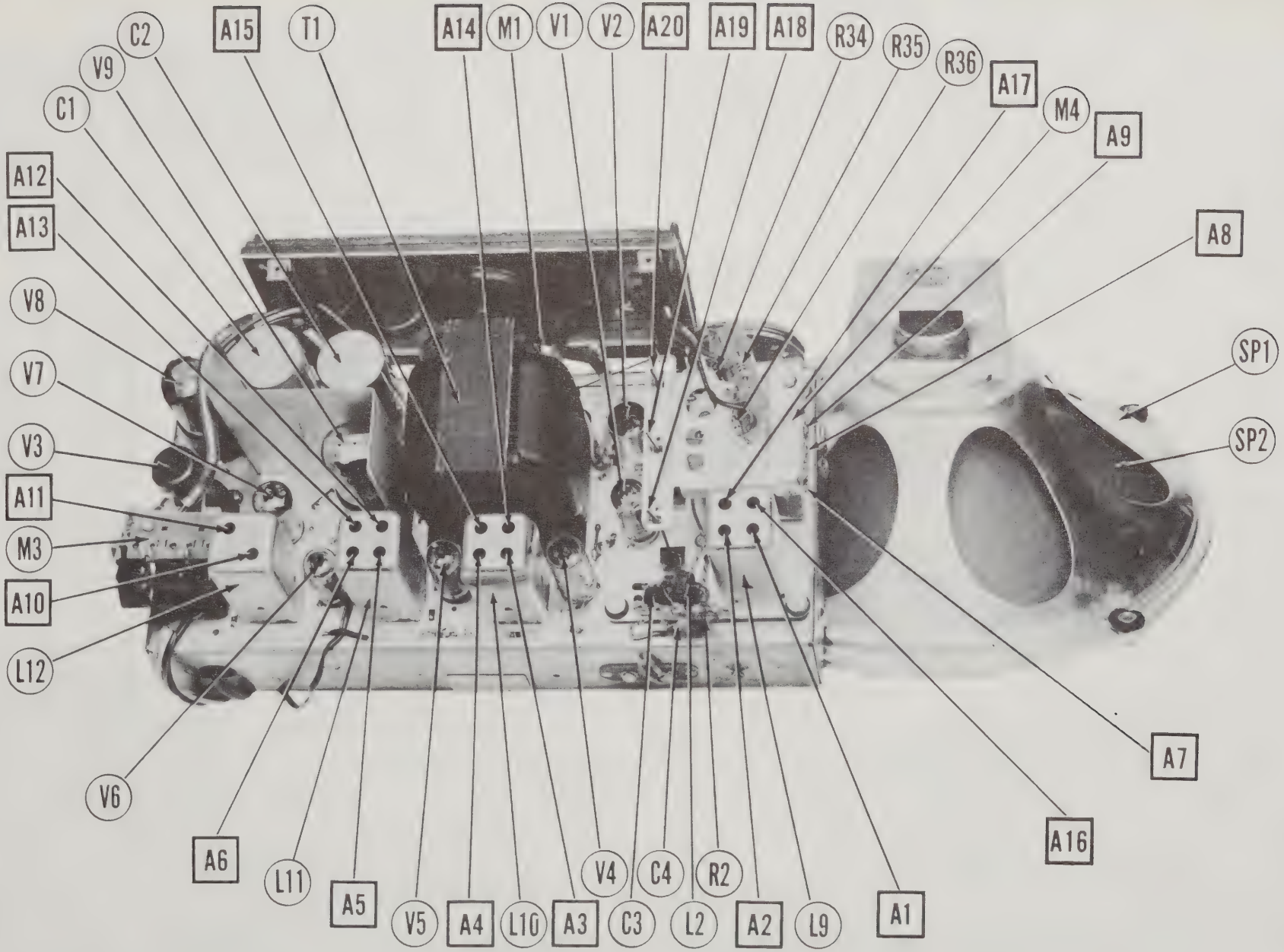
ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	ZENITH PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1	117VAC @ .72A	650VAC CT @ .086A	5VAC @ 3A	6.3VAC @ 3A	95-1117	P-6012 ‡#	PV-100#	[illegible]

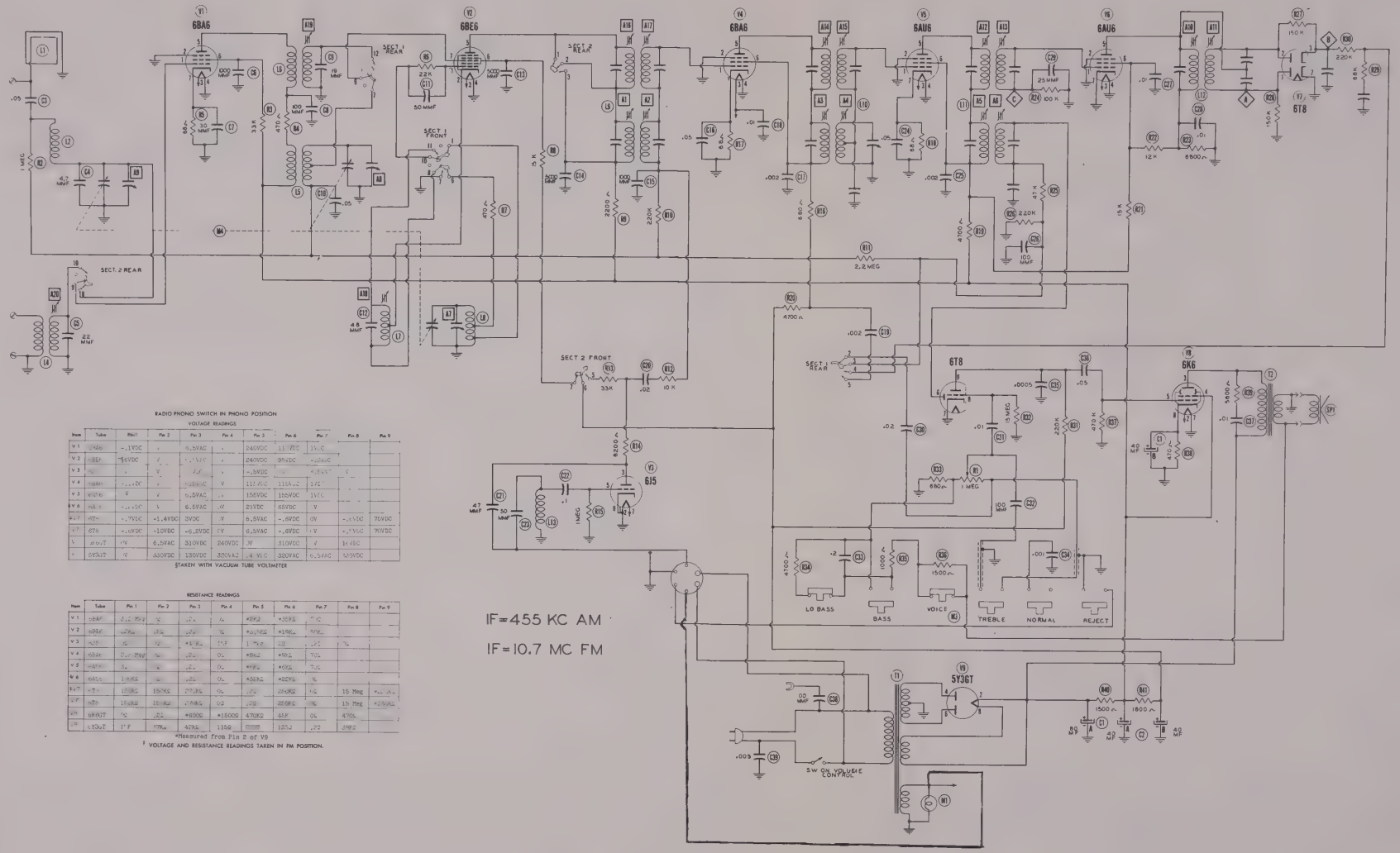
‡Mount Vertically Using Universal Mounting Brackets.
#Drill New Mounting Holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		ZENITH PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
	PRI.	SEC.	PRI	SEC.					
T2	6500Ω	3.3Ω	600Ω	.5Ω	95-1063	A-3823§	RO-13§	A-2901§	§Drill One New Mounting Hole.




C2
V9
C1
A12
A13
V8
V7
V3
A11
M3
A10
L12
V6
A15
T1
A14
M1
V1
V2
A20
A19
A18
R34
R35
R36
A17
M4
A9
A8
SP1
SP2
A7
A16
A6
L11
A5
V5
A4
L10
A3
V4
C4
C3
R2
L2
A2
L9
A1



RADIO PHONO SWITCH IN PHONO POSITION

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BA6	-.1VDC	0	6.5VAC	0	240VDC	117VDC	1V.C		
V 2	6BE6	76VDC	0	6.5VAC	0	240VDC	95VDC	-.2VDC		
V 3	6AU6	0	0	6.5VAC	0	-.5VDC	0	4.5VDC	0	
V 4	6BA6	-.1VDC	0	6.5VAC	0	117VDC	115VDC	1VDC		
V 5	6AU6	0	0	6.5VAC	0	155VDC	155VDC	1VDC		
V 6	6AU6	-.1VDC	0	6.5VAC	0	215VDC	65VDC	0		
V 7	6T8	-.7VDC	+1.4VDC	3VDC	0	6.5VAC	-.6VDC	0V	-.1VDC	75VDC
V 8	6T8	-.6VDC	-10VDC	-6.2VDC	0	6.5VAC	-.6VDC	0	-.1VDC	70VDC
V 9	6K6	0	6.5VAC	310VDC	240VDC	0	310VDC	0	14VDC	
V 10	5Y3GT	0	350VDC	330VAC	320VAC	0	350VAC	0.5VAC	0	0

TAKEN WITH VACUUM TUBE VOLTMETER

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BA6	2.2 Meg	0	1.2Ω	0	*8KΩ	*350Ω	0 Ω		
V 2	6BE6	470KΩ	18Ω	1.2Ω	0	*2.2MΩ	*19KΩ	470Ω		
V 3	6AU6	0Ω	0Ω	*4.7KΩ	0	1 MEG	1Ω	1.2Ω	0	
V 4	6BA6	2.2 Meg	0Ω	1.2Ω	0	*8KΩ	*19KΩ	70Ω		
V 5	6AU6	0Ω	0Ω	1.2Ω	0	*4KΩ	*10KΩ	0Ω		
V 6	6AU6	1.1MΩ	0Ω	1.2Ω	0	*.2MΩ	*20KΩ	0Ω		
V 7	6T8	10MΩ	150KΩ	270KΩ	0Ω	1.2Ω	26KΩ	0Ω	15 Meg	*.2MΩ
V 8	6T8	10MΩ	10MΩ	1.2MΩ	0Ω	1.2Ω	26KΩ	0Ω	15 Meg	*.2MΩ
V 9	6K6GT	0Ω	1.2Ω	*800Ω	*1500Ω	470KΩ	45K	0Ω	470Ω	
V 10	5Y3GT	1.2Ω	470Ω	42Ω	115Ω	∞	125Ω	1.2Ω	39Ω	

*Measured from Pin 2 of V8

† VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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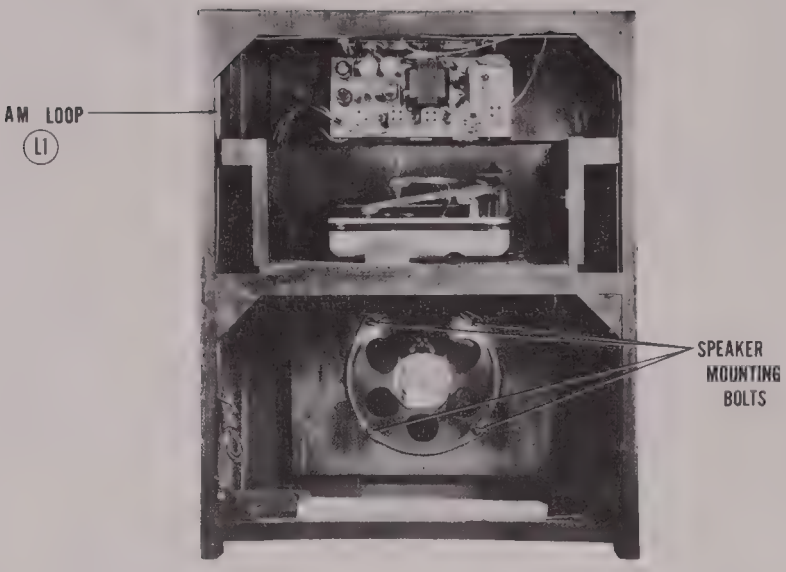

DISASSEMBLY INSTRUCTIONS

1. Remove three push-on type control knobs.
2. Remove eight wood screws holding back cover. Remove back cover.
3. Disconnect phono plug at bottom of changer and remove speaker plugs from speaker.
4. Remove escutcheon holding tone controls, on each side of dial by pulling up on outer edge.
5. Remove two phillips head screws holding tone controls to each escutcheon plate.
6. Open record changer compartment door and pull changer out. Remove four metal hole plugs. Hold chassis securely with one hand and remove the four screws holding chassis. Remove chassis out rear of cabinet.
7. Remove four 11/32" hex nuts holding speaker. Remove speaker.

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to pin 7 (Grid) 6BE6 (V2). Low side to chassis.	455KC	BC (fully clock-wise)	600KC	Across voice coil	A1,A2 A3,A4 A5,A6	Adjust for maximum output.
2.		Loop	1600KC	"	1600KC	"	A7	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		Loop	1400KC	"	Tune for maximum output.	"	A8,A9	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.05MFD	High side to pin 1 (Grid) 6AU6 (V6). Low side to chassis.	10.7MC	FM (center position)	Point of non-interference	DC Probe to Point (A) Common to chassis.	A10	Adjust for maximum deflection.
5.	.05MFD	"	"	"	"	DC Probe to Point (B) Common to chassis.	A11	Adjust for zero reading. A positive & negative reading is obtained on either side of the correct setting.
6.	.05MFD	High side to pin 1 (Grid) 6AU6 (V5). Low side to chassis.	"	"	"	DC Probe to Point (C) Common to chassis.	A12, A13	Adjust for maximum deflection.
7.	.05MFD	High side to pin 1 (Grid) 6BA6 (V4). Low side to chassis.	"	"	"	"	A14, A15	Adjust for maximum deflection.
8.	.05MFD	High side to pin 7 (Grid) 6BE6 (V2). Low side to chassis.	"	"	"	"	A16, A17	Adjust for maximum deflection.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60\ modulation and 450KC sweep. Use 120\ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	.05MFD	High side to pin 7 (Grid) 6BE6 (V2). Low side to chassis	10.7MC (450KC Sweep)	10.7MC	FM	Vert. Amp. to Point (C) Low side to chassis.	A12, A13, A14, A15, A16, A17	Adjust for maximum amplitude & symmetry as per Fig 1.
5.	.05MFD	"	"	"	"	Vert. Amp. to Point (B) Low side to chassis.	A10, A11	Adjust A10 for max. amplitude & straightness of crossover lines as per Fig 2. Adjust A11 sc that the crossover point occurrs at center of pattern. Continue with step 9.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
9.	270Ω carbon res.	High side to FM Ant. terminal (Remove line ant.). Low side to chassis.	98MC (Unmod.)	FM	98MC	DC Probe to Point (C) Common to chassis.	A18	Loosen cement holding slugs with hot iron. Adjust A18 for maximum deflection.
10.	270Ω carbon res.	"	"	"	Tune for maximum deflection.	"	A19, A20	Adjust for maximum deflection.

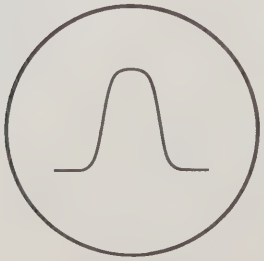

FIG. 1

FIG. 2

PHOTOFACT* Folder

ZENITH MODELS 28T925, 28T960, 28T961, 28T962, 28T963

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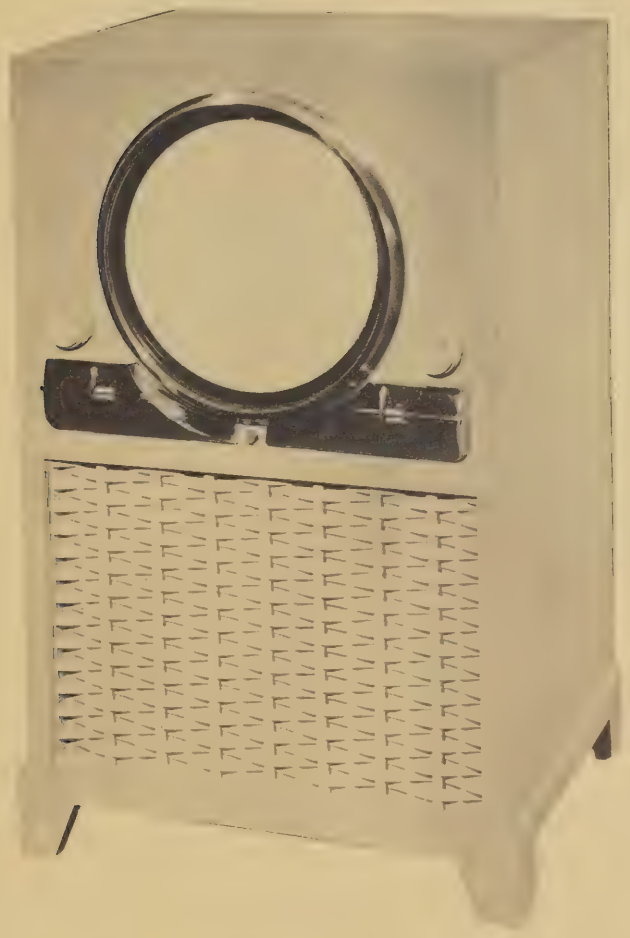

Model 28T960E

ZENITH MODELS 28T925, 28T960, 28T961, 28T962, 28T963

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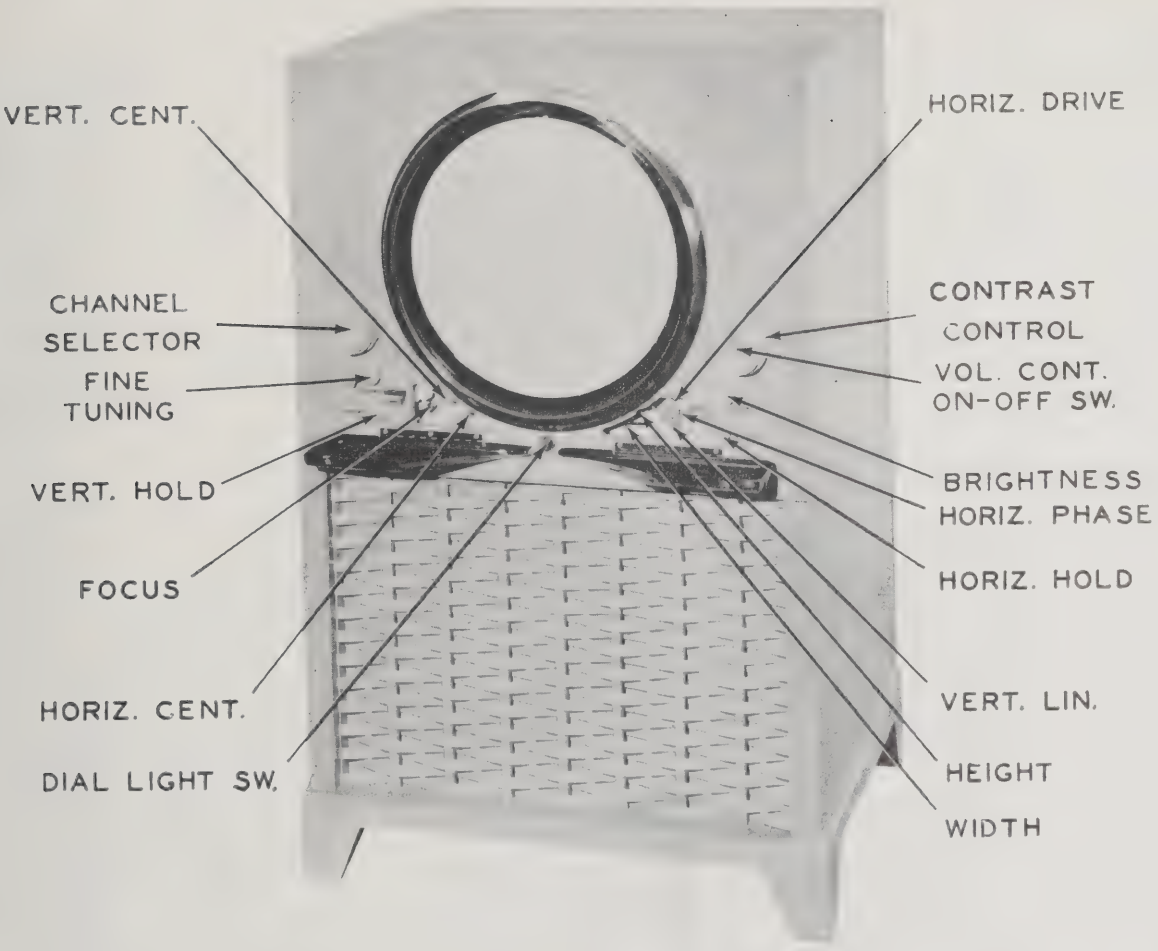
Date 6/49—No. 4912-15 Set No. 64—Folder No. 15



ZENITH MODELS 28T925, 28T960, 28T961, 28T962, 28T963

ZENITH MODEL 28T960

TRADE NAME	Zenith, Models 28T925, 28T960, 28T961, 28T962, 28T963. Chassis 28F20, 28F20Z, 28F21, 28F22.
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago, Illinois
TYPE SET	Television Receiver
TUBES	Twenty-eight
POWER SUPPLY	117 Volts, 60 Cycle AC
TUNING RANGE	Channels 2 through 13 RATING 3.11 Amps @ 117 Volts

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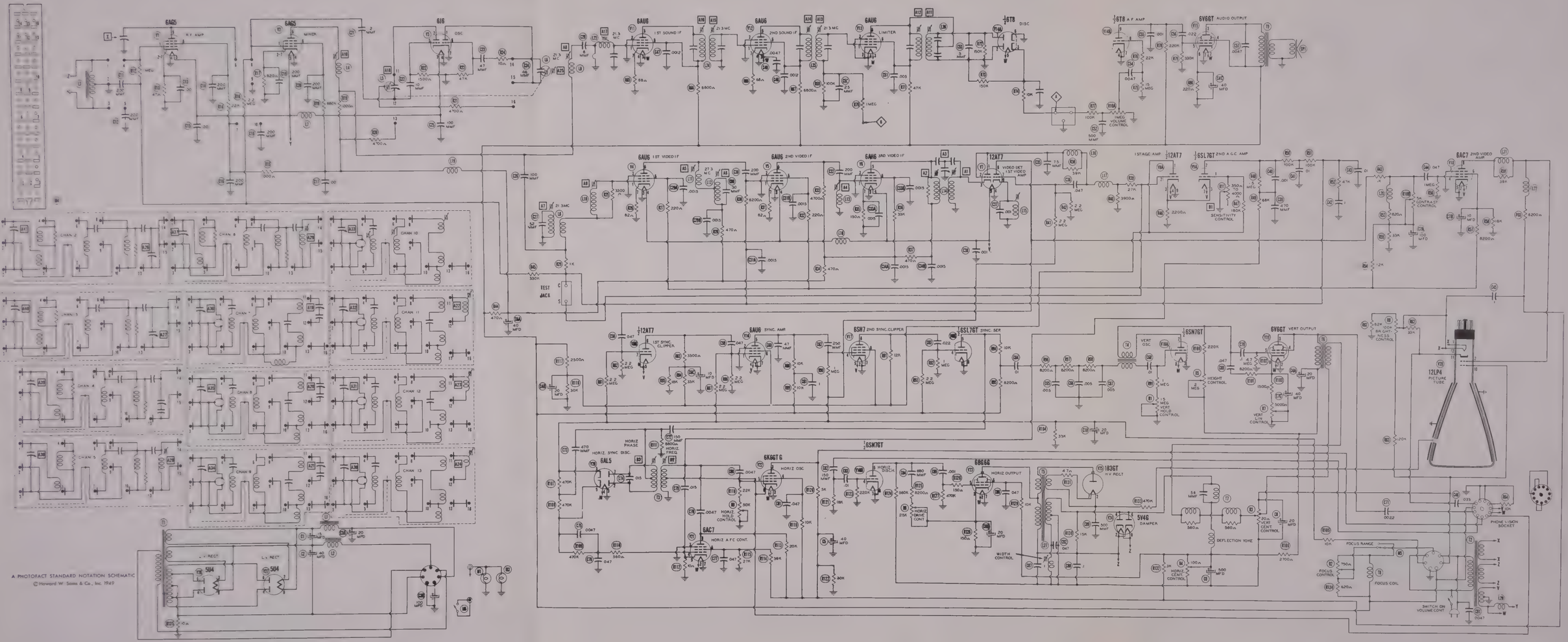
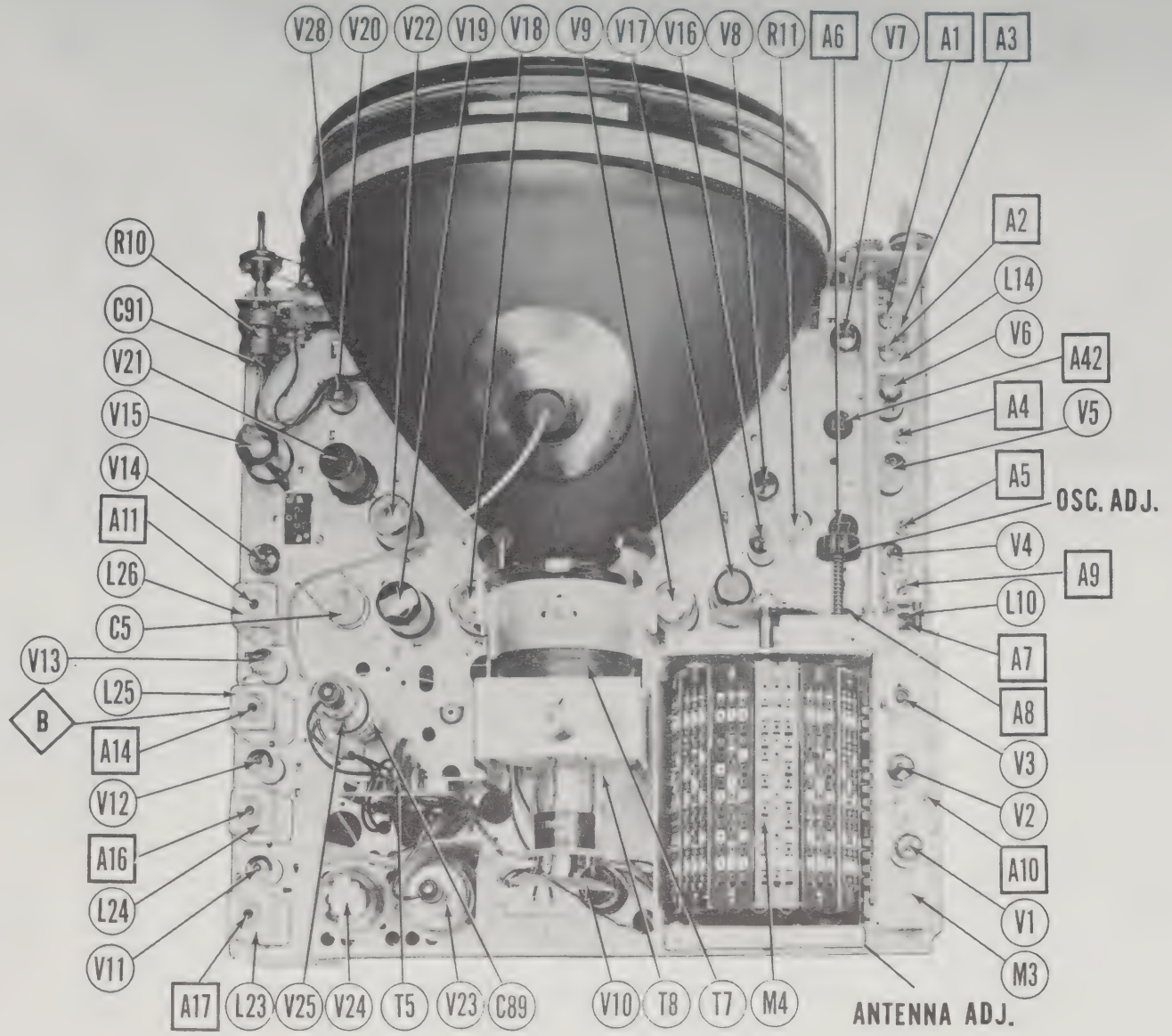
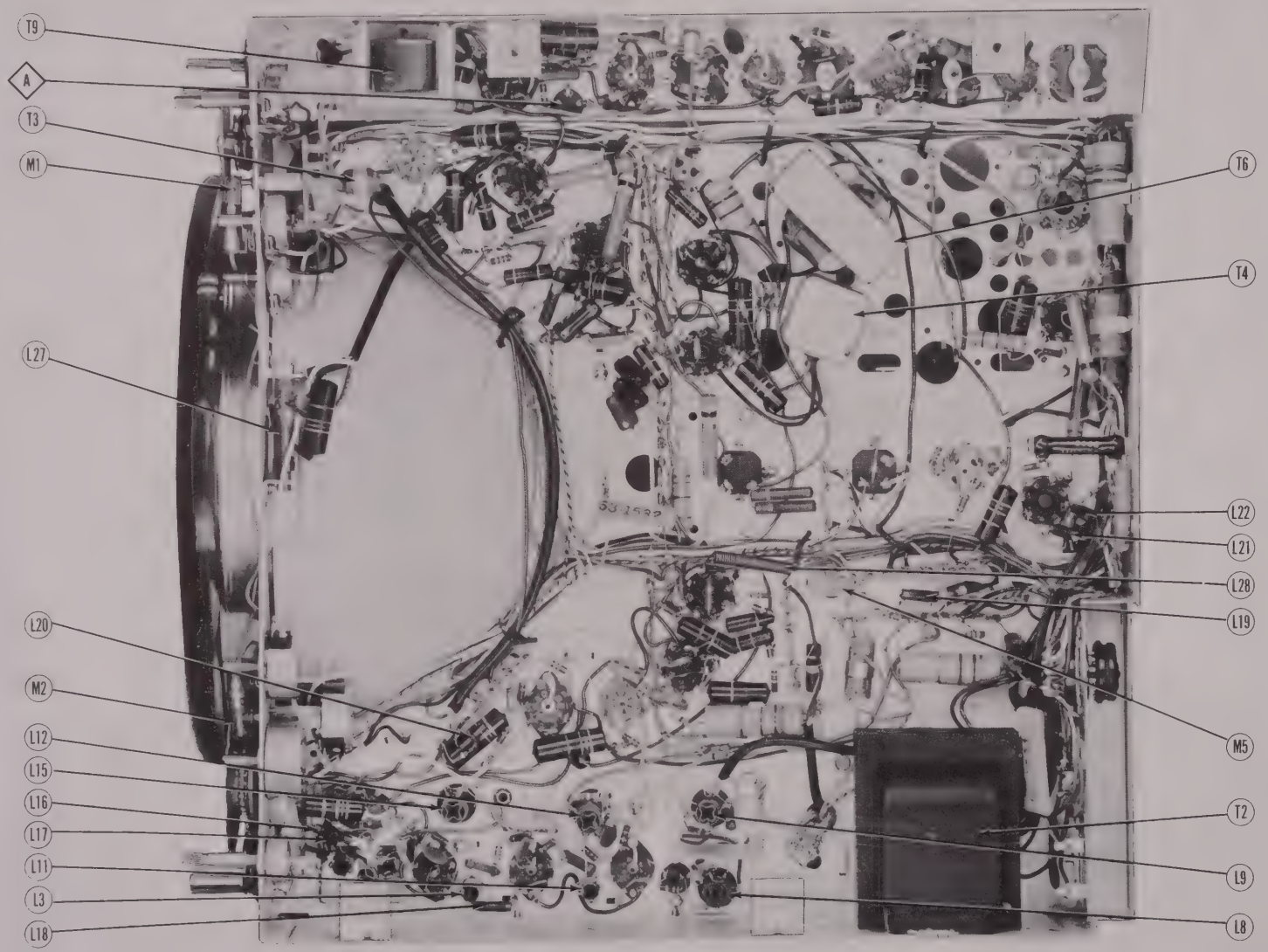
DATE 6/49 4912-15 SET #64 FOLDER 15



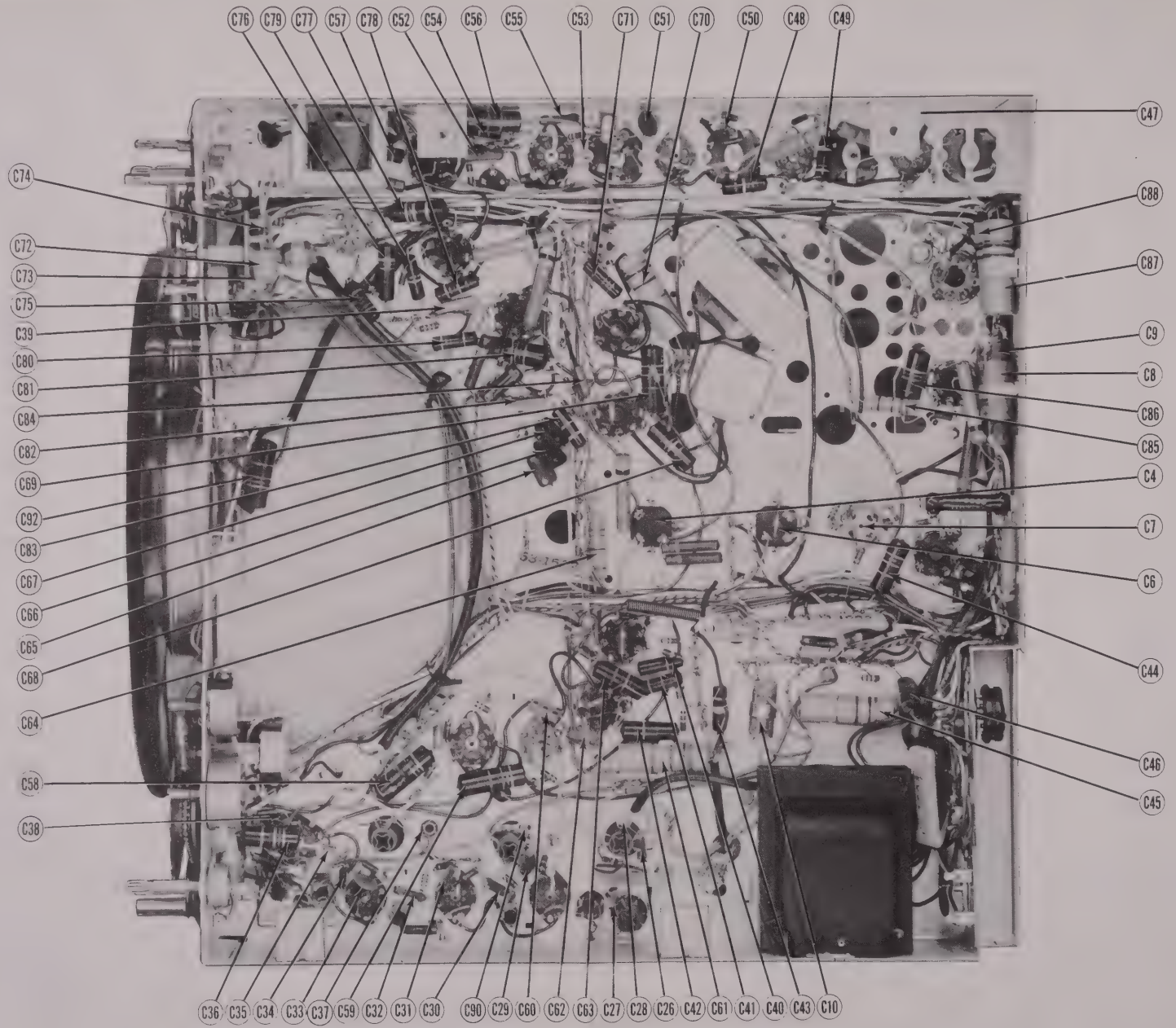
ZENITH MODELS 28T925, 28T960, 28T961, 28T962, 28T963



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

ALIGNMENT INSTRUCTIONS

VIDEO IF ALIGNMENT

Connect a -1.5 volt bias battery to AGC line. Remove the AGC tube (V8) and connect the negative side of the bias battery to test jack "C" and the positive side to chassis.
Connect the synchronized sweep voltage from the signal generator to the oscilloscope horizontal amplifier input for horizontal deflection.
Remove the oscillator tube (V3) during the video IF alignment.
To disable the high voltage remove the horizontal oscillator tube (V22) from its socket.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	500MMF	High side to pin 1 (Grid) of 6AH6 (V6). Low side to chassis.	24MC (10MC Sweep)	21.6MC 25.9MC	Any	Vert. Amp. thru 100KΩ to test jack "S". Low side to chassis.	A1, A2 A3	Adjust A1 and A2 to obtain pattern as per Fig 1 with peaks being of equal amplitude and the 21.6MC marker properly placed on the pattern. Adjust A3 to place 25.9MC marker at the high freq. peak. Check position of 21.6MC marker. If necessary repeat adjustment of A1, A2 and A3.
2.	500MMF	High side to pin 1 (Grid) of 6AU6 (V5). Low side to chassis.	"	25.3MC	"	"	A4	Reduce sweep generator output until amplitude is approximately same as that obtained in step 1. Adjust A4 for pattern and placement of 25.3MC marker as per Fig 2.
3.	500MMF	High side to pin 1 (Grid) of 6AU6 (V4). Low side to chassis.	"	22.2MC 25.1MC	"	"	A5	Adjust for pattern and placement of 22.2MC marker as per Fig 3. The 25.1MC should fall approximately as shown in Fig 3.
4.	500MMF	"	"	27.3MC	"	"	A6	Use maximum marker amplitude and adjust trap A6 so 27.3MC marker disappears at "notch" as per Fig 3.
5.	Direct	High side to an ungrounded tube shield slipped over the converter tube. Low side to chassis.	"	21.3MC	"	"	A7, A8	Adjust traps A7 and A8 for minimum indication of 21.3MC marker as per Fig 4.
6.	Direct	"	"	21.3MC 22.2MC 25.1MC 25.8MC 27.3MC	"	"	A9, A10	Adjust A9 and A10 alternately for reasonably flat topped pattern as per Fig 4. Check markers to see that they appear at proper points on the pattern. The 25.8MC marker is located at 50% on the high freq. slope side of the overall video IF pattern (Fig 4).

SOUND IF ALIGNMENT

The sound IF transformers used in this receiver have specially designed slugs and require a special alignment tool. (Zenith Part No. 68-7). Both slugs of each transformer are accessible from the hole in the top of the transformer. The alignment wrench is partially inserted to align the top winding and fully inserted to adjust the slug for the bottom winding.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	500MMF	High side to pin 1 (Grid) of 6AU6 (V13) Low side to chassis.	21.8MC (1MC Sweep)	21.3MC	Any	Vert. Amp. to Point A Low side to chassis.	A11, A12	Adjust A11 and A12 for maximum amplitude and symmetry as per Fig 5 with 21.3MC marker at center. The peak to peak discriminator width is approximately 450KC.
8.	500MMF	High side to pin 1 (Grid) of 6AU6 (V12) Low side to chassis.	"	"	"	Vert. Amp. to Point B Low side to chassis.	A13, A14	Adjust for maximum amplitude and symmetry as per Fig 6.
9.	500MMF	High side to pin 1 (Grid) of 6AU6 (V11) Low side to chassis.	"	"	"	"	A15, A16	"
10.	500MMF	High side to an ungrounded tube shield placed over the mixer tube (V2). Low side to chassis.	"	"	"	"	A17	"

FIG. 1

FIG. 2

FIG. 3

FIG. 4

OSCILLATOR ALIGNMENT

The trimmer X located in the plate circuit of the RF Amp. is for compensation of interelectrode capacity of the tube and capacity of the circuit wiring and is pre-set at the factory. Do not adjust in field unless proper equipment is available. It is suggested that the oscillator circuits be checked before attempting alignment to determine if adjustment is actually necessary. This is done by connecting the signal generator and VTVM as outlined below in step 11. Set the signal generator to the sound carrier frequency of the channel being checked and turn the fine tuning control. The VTVM will indicate both a positive and negative peak as the fine tuning control passes through resonance. The proper adjustment is the zero point between the two peaks. If the zero point cannont be obtained, alignment of the oscillator circuits should be performed in the order given starting with step 11. The oscillator adjustments are made by depressing knob at the front end of the tuner except for A18 and A25 which are shown in side view photograph of the tuner.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
11.	Two 150Ω carbon res.	Across Antenna terminals with 150Ω resistor in each lead.	187.75MC	10	DC Probe to Point ◇ Common to chassis.	A18	Pre-set the fine tuning control so that the widest area of the eccentric tuning slugs points upward. Insert a pointed tool thru one of the adjustment slots and turn A18 (air trimmer disc.) until zero point between the positive and negative peaks is obtained.
12.	Two 150Ω carbon res.	"	179.75MC 185.75MC 191.75MC 203.75MC 209.75MC 215.75MC	7 8 9 11 12 13	"	A19 A20 A21 A22 A23 A24	Pre-set fine tuning as above and adjust A19 thru A24 for zero reading at their respective channels.
13.	"	"	71.25MC	4	"	A25	Pre-set fine tuning control as above and adjust slug A25 for zero reading.
14.	"	"	59.75MC 65.75MC 81.75MC 87.75MC	2 3 5 6	"	A26 A27 A28 A29	Pre-set fine tuning control as above and adjust A26 thru A29 at their respective channels.

ANTENNA ALIGNMENT

Remove the AGC tube (V8) and connect -1.5 volt bias battery from test jack "C" to chassis.
The antenna adjustments are accessible through hole in rear of the tuner.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
15.	Two 150Ω carbon res.	Across Antenna terminals with 150Ω resistor in each lead.	213MC (10MC Sweep)	211.25MC 215.75MC	13	Vert. Amp. to test jack "S". Low side to chassis (If scope is not calibrated use VTVM and attenuate sweep generator to give 1.5 to 2 volt reading.	A30	Keep sweep generator attenuated so scope pattern does not exceed 3 volts peak to peak. Adjust trimmer for maximum amplitude and symmetry as per Fig 7. Check to see that markers appear at proper points on the pattern.
16.	Two 150Ω carbon res.	"	207MC (10MC Sweep)	205.25MC 209.75MC	12	"	A31	"
			201MC (10MC Sweep)	199.25MC 203.75MC	11		A32	
			195MC (10MC Sweep)	193.25MC 197.75MC	10		A33	
			189MC (10MC Sweep)	187.25MC 191.75MC	9		A34	
			183MC (10MC Sweep)	181.25MC 185.75MC	8		A35	
			177MC (10MC Sweep)	175.25MC 179.75MC	7		A36	
			85MC (10MC Sweep)	83.25MC 87.75MC	6		A37	
			79MC (10MC Sweep)	77.25MC 81.75MC	5		A38	
			69MC (10MC Sweep)	67.25MC 71.75MC	4		A39	
			63MC (10MC Sweep)	61.25MC 65.75MC	3		A40	
			57MC (10MC Sweep)	55.25MC 59.75MC	2		A41	

IMPORTANT: All other adjustments in the tuner are Pre-Set at the factory and should not be adjusted in the field.

4.5MC TRAP ADJUSTMENT

Adjustment of this trap is usually not necessary unless the unit has been tampered with or a component replaced.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT RF-VTVM	ADJUST	REMARKS
17.	5000MMF	High side to pin 7 (Grid) of 12AT7 (V7). Low side to chassis.	4.5MC (Set very accurately)	Any	RF Probe to Picture tube grid (Pin 2 of V28). Common to chassis.	A42	Turn contrast control to give 1 volt reading on RF-VTVM. Adjust A42 for minimum indication.

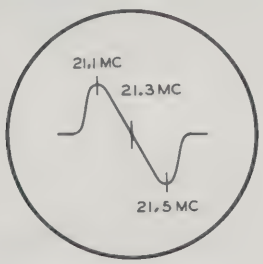
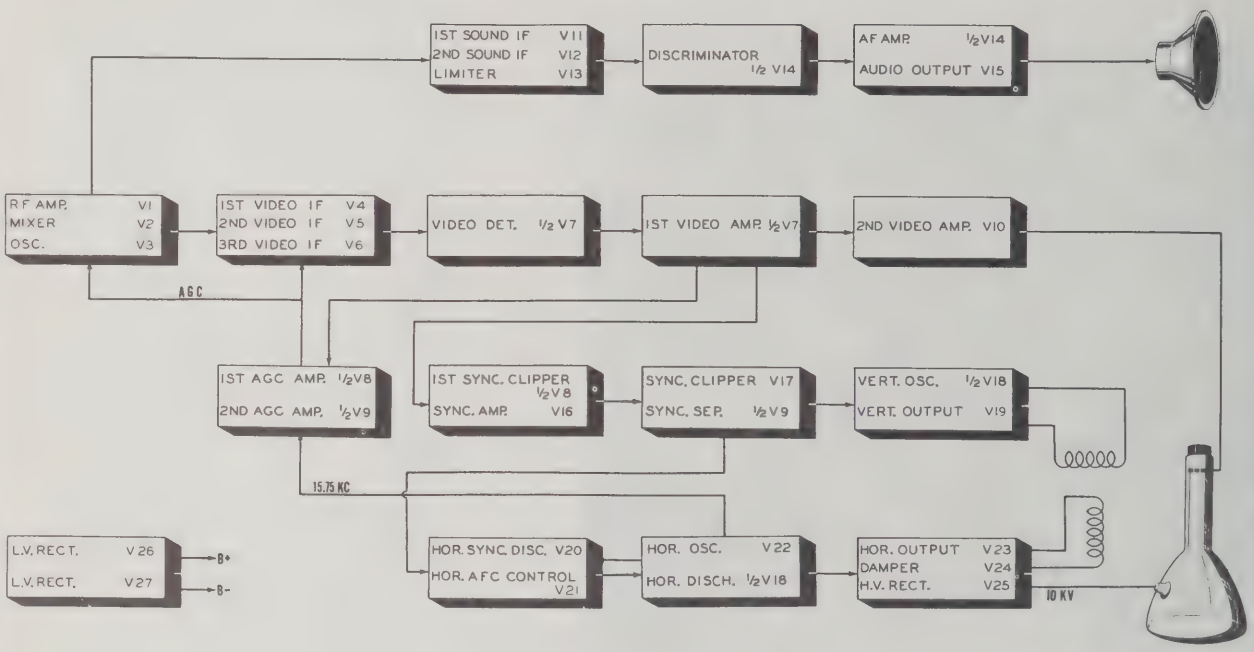


FIG. 5

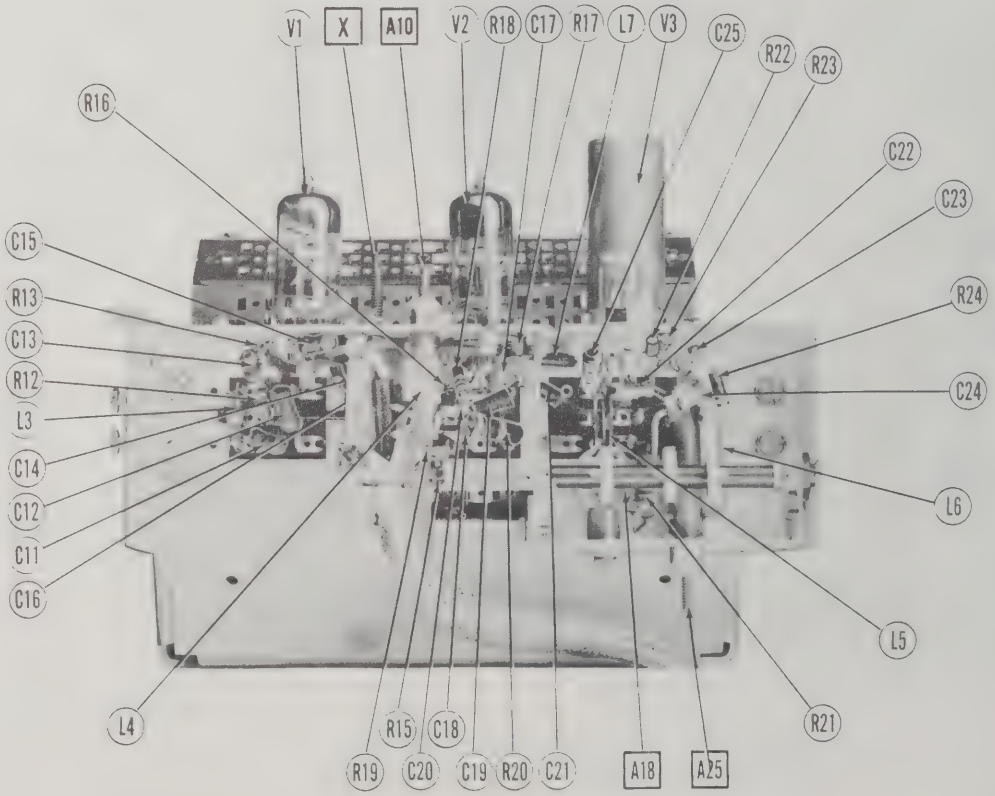
FIG. 6

FIG. 7

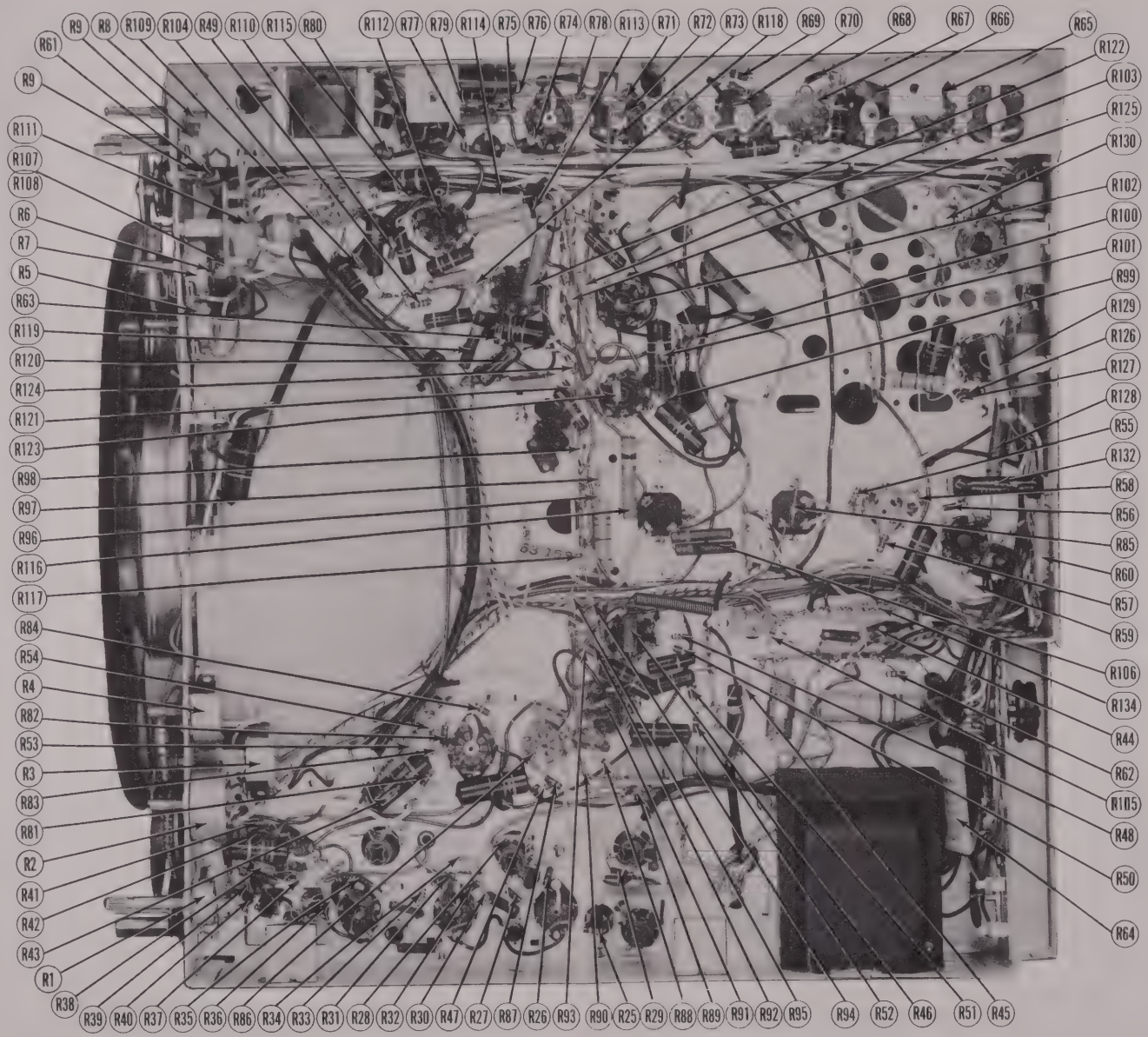
ZENITH MODELS 28T925, 28T960, 28T961, 28T962, 28T963



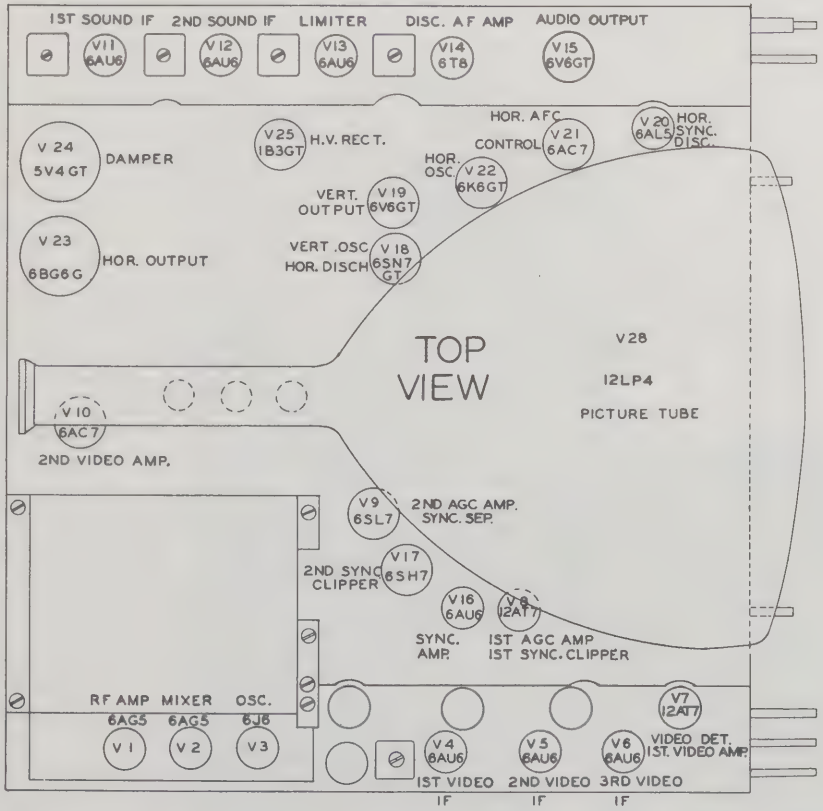
BLOCK DIAGRAM

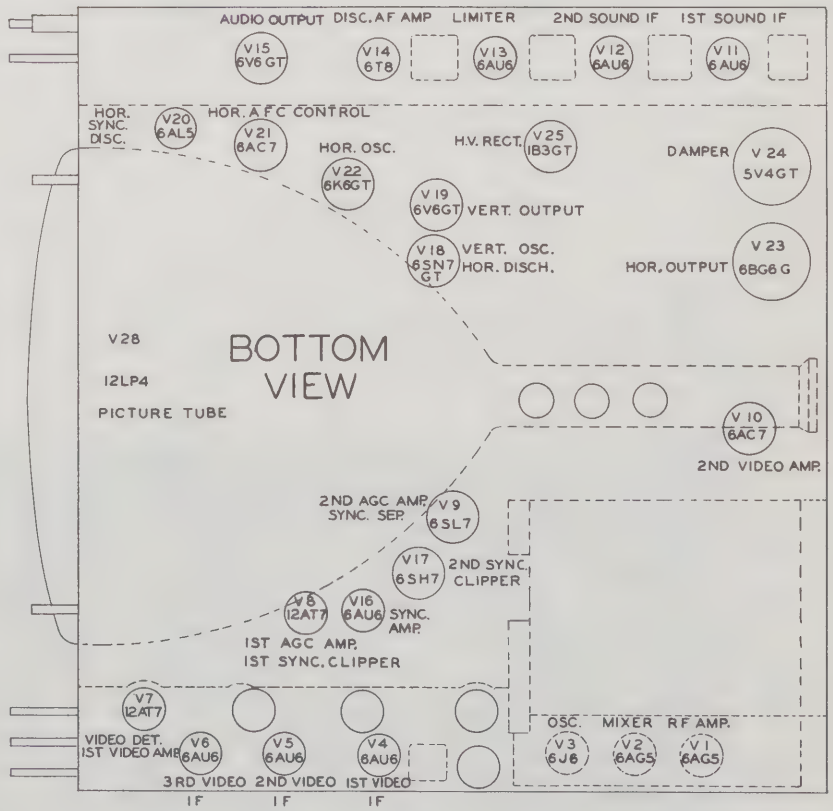


RF TUNER-LEFT SIDE



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION





TUBE PLACEMENT CHART

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	-5.8VDC	.7VDC	6.3VAC	0V	195VDC	115VDC	.7VDC		
V 2	6AG5	-1.6VDC	.6VDC	6.3VAC	0V	1[illegible]VDC	[illegible]VDC	.5VDC		
V 3	6J6	120VDC	‡95VDC	6.3VAC	0V	‡§ -4.2VDC	§-5VDC	0V		
V 4	6AU6	-.2VDC	0V	6.3VAC	0V	200VDC	140VDC	.6VDC		
V 5	6AU6	-.2VDC	0V	6.3VAC	0V	175VDC	140VDC	.6VDC		
V 6	6AH6	0V	0V	6.3VAC	0V	200VDC	135VDC	1.4VDC		
V 7	12AT7	-.6VDC	-.6VDC	0V	0V	0V	85VDC	-.5VDC	0V	6.3VAC
V 8	12AT7	140VDC	-.2VDC	2.3VAC	6.3VAC	6.3VAC	50VDC	-.5VDC	0V	0V
V 9	6SL7GT	.2VDC	-.1VDC	2.3VDC	-2.2VDC	1[illegible]VDC	0V	6.3VAC	0V	
V 10	6AC7	0V	0V	0V	-.4VDC	0V	[illegible]0VDC	6.3VAC	190VDC	
V 11	6AU6	0V	0V	6.3VAC	0V	1[illegible]VDC	135VDC	.8VDC		
V 12	6AU6	0V	0V	6.3VAC	0V	135VDC	135VDC	.8VDC		
V 13	6AU6	-.7VDC	0V	6.3VAC	0V	55VDC	55VDC	0V		
V 14	6T8	-.5VDC	-.5VDC	4.5VDC	0V	6.3VAC	0V	0V	-.5VDC	75VDC
V 15	6V6GT	0V	6.3VAC	200VDC	225VDC	0V	0V	0V	9.8VDC	
V 16	6AU6	-.6VDC	0V	0V	6.3VAC	55VDC	135VDC	0V		
V 17	6SH7	0V	0V	0V	-.4VDC	0V	135VDC	6.3VAC	100VDC	
V 18	6SN7GT	-10VDC	140VDC 3[illegible]VDC	0V	-20VDC	36VDC	0V	0V	6.3VAC	
V 19	6V6GT	0V	0V	330VDC	330VDC	0V	0V	6.3VAC	25VDC 43VDC	
V 20	6AL5	-2.6VDC	-9VDC	0V	6.3VAC	-1.2VDC	0V	-6.5VDC		
V 21	6AC7	0V	0V	0V	-.9VDC	0V	90VDC	6.3VAC	220VDC	
V 22	6K6GT-G	0V	0V	160VDC	160VDC	-14VDC	40[illegible]VDC	6.3VAC	.4VDC	
V 23	6BG6G	0V	6.3VAC	14VDC	6.3VAC	1VDC	1VDC	0V	270VDC	TOP CAP †
V 24	5V4G	0V	4[illegible]VDC	0V	4[illegible]VDC	0V	4[illegible]VDC	0V	4[illegible]0VDC	
V 25	1B3GT	† DO NOT MEASURE								
V 26	5U4G	0V	340VDC	0V	320VAC	0V	320VAC	0V	340VDC	
V 27	5U4G	0V	430VDC	0V	3[illegible]VAC	3[illegible]VDC	3[illegible]VAC	0V	430VDC	
V28B	12KP4	*215VDC	*0[illegible]VDC	PIN 10 3[illegible]VDC	PIN 11 2[illegible]VDC	PIN 12 *215VDC				

Measurements taken on channel 4 unless otherwise stated
† Do not measure
§ Taken with vacuum tube voltmeter
* 6.3VAC measured between filament pins
‡ Measured on channel 10

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	2.5 Meg.	47Ω	.2Ω	0Ω	*2KΩ	*24KΩ	47Ω		
V 2	6AG5	3.5 Meg.	820Ω	.2Ω	0Ω	*2KΩ	*550KΩ	820Ω		
V 3	6J6	*5KΩ	*10KΩ	.2Ω	0Ω	1500Ω	47KΩ	0Ω		
V 4	6AU6	1.5 Meg.	0Ω	.2Ω	0Ω	*1500Ω	*3KΩ	82Ω		
V 5	6AU6	1.5 Meg.	0Ω	.2Ω	0Ω	*6KΩ	*3KΩ	82Ω		
V 6	6AH6	.2Ω	0Ω	.2Ω	0Ω	2KΩ	*30KΩ	150Ω		
V 7	12AT7	4KΩ	4KΩ	.1Ω	0Ω	0Ω	*12KΩ	1 Meg.	0Ω	.2Ω
V 8	12AT7	*2.8KΩ	32KΩ	2.2KΩ	.2Ω	.2Ω	*18KΩ	1 Meg.	0Ω	0Ω
V 9	6SL7GT	300Ω	1.3 Meg.	2.2KΩ	600KΩ	*20KΩ	0Ω	.2Ω	0Ω	
V 10	6AC7	0Ω	0Ω	0Ω	1 Meg.	0Ω	*8.5KΩ	.2Ω	**9KΩ	
V 11	6AU6	.1Ω	0Ω	.2Ω	0Ω	*7.5KΩ	*7.5KΩ	68Ω		
V 12	6AU6	.1Ω	0Ω	.2Ω	0Ω	*7.5KΩ	*7.5KΩ	68Ω		
V 13	6AU6	100KΩ	0Ω	.2Ω	0Ω	*47KΩ	*47KΩ	0Ω		
V 14	6T8	150KΩ	150KΩ	250KΩ	0Ω	.2Ω	0Ω	0Ω	15 Meg.	*220KΩ
V 15	6V6GT	0Ω	.2Ω	*1200Ω	*520Ω	330KΩ	24Ω	0Ω	220Ω	
V 16	6AU6	1 Meg.	0Ω	0Ω	.2Ω	*20KΩ	*2.8KΩ	0Ω		
V 17	6SH7	0Ω	0Ω	0Ω	850KΩ	0Ω	*2.8KΩ	.2Ω	*15KΩ	
V 18	6SN7GT	2.8 Meg.	**2.2Meg **90KΩ	0Ω	220KΩ	**560KΩ	0Ω	0Ω	.2Ω	
V 19	6V6GT	0Ω	0Ω	**3KΩ	**3KΩ	4.7 Meg.	Inf.	.2Ω	0.5KΩ 1500Ω	
V 20	6AL5	7.5KΩ	470KΩ	0Ω	.2Ω	1 Meg.	0Ω	470KΩ		
V 21	6AC7	0Ω	0Ω	0Ω	1.4Meg.	10%	**26KΩ	.2Ω	**23KΩ	
V 22	6K6GT-G	Inf.	0Ω	**8KΩ	**13KΩ	70KΩ	[illegible]2KΩ	.2Ω	15Ω	
V 23	6BG6G	Inf.	.2Ω	150Ω	.2Ω	5.0KΩ	5[illegible]KΩ	0Ω	**10KΩ	TOP CAP **15KΩ
V 24	5V4G	Inf.	**14KΩ	Inf.	**160Ω	Inf.	**100Ω	Inf.	**14KΩ	
V 25	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP **15KΩ
V 26	5U4G	Inf.	6KΩ	Inf.	20Ω	Inf.	20Ω	Inf.	6KΩ	
V 27	5U4G	Inf.	20KΩ	Inf.	22Ω	6KΩ	2[illegible]Ω	Inf.	20KΩ	
V28B	12KP4	[illegible]0KΩ	**[illegible]KΩ	PIN 10 **130Ω	PIN 11 1[illegible]0KΩ	PIN 12 80KΩ				

* Measured from pin 8 of V26
** Measured from pin 8 of V27

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.

ZENITH MODELS 28192S, 28196O, 28196I, 28196Z, 28196Z3

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.	6AU6	6AU6	7BD	
V2	Mixer	6AU6	6AU6	7BF	
V3	Oscillator	6J6	6J6	7BF	
V4	1st Video IF	6AU6	6AU6	7BK	
V5	2nd Video IF	6AU6	6AU6	7BK	
V6	3rd Video IF	6AU6	6AU6	7BK	
V7	Video Det.-1st Video Amp.	12AT7	12AT7		
V8	1st AGC Amp.-1st Sync.Clipper	12AT7	12AT7		
V9	2nd AGC Amp.-Sync . Sep.	6SL7GT	6SL7GT	8BD	
V10	2nd Video Amp.	6AC7	6AC7	8N	
V11	1st Sound IF	6AU6	6AU6	7BK	
V12	2nd Sound IF	6AU6	6AU6	7BK	
V13	Limiter	6AU6	6AU6	7BK	
V14	Disc.-AF Amp.	6T8	6T8		
V15	Audio Output	6V6GT	6V6GT	7AC	
V16	Sync. Amp.	6AU6	6AU6	7BK	
V17	2nd Sync. Clipper	6SH7	6SH7	8BK	
V18	Vert.Osc.-Horiz. Disch.	6SN7GT	6SN7GT	8BD	
V19	Vert. Output	6V6GT	6V6GT	7AC	
V20	Horiz. Sync. Disc.	6AL5	6AL5	6BT	
V21	Horiz. AFC Control	6AC7	6AC7	8N	
V22	Horiz. Osc.	6K6GT	7S	7S	
V23	Horiz. Output	6B6G	6BT	6BT	
V24	Damper	5Y4G	5L	5L	
V25	HV Rect.	1B3GT	3C	3C	
V26	LV Rect.	5U4G	5T	5T	
V27	LV Rect.	5U4G	5T	5T	
V28A	Picture Tube	12LP4			Used on 28P20 and 28P20Z Chassis
B	Picture Tube	12KP4	" "	"	
C	Picture Tube	10BP4			Used on 28P21 and 28P22 Chassis
D	Picture Tube	10FP4	" "	"	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1	15	200	22-1826	AF3G	UP2025			TVL-70	Filter
C2	40	400	22-1827	AF8J	UP1111			TVL-8	" "
					451				
C3A	20	475	22-1828	AF4K29G	UP9BJ			TVL-19	◓ Filter
B	100	300			1016				▲ "
C4A	30	475	22-1836	AFH14K4G8A	UP7CJ			TVL-31	◓ Decoupling
B	40	350			1014				■ "
C	40	25							▲ Output Cath. Bypass
C5	40	450	22-1573	AF8J	UP4045			TVL-7	◓ Filter
C6A	40	350	22-1837	AF862J4A*	UP7CJ			TVL-23	◓ Filter
B	20	300			971				■ Hor. Output Cath. Byp.
C	30	300							▲ Decoupling
C7A	30	500	22-1838	AFH202E8B	UP7CJ			TVL-21	◓ Low Pass Filter
B	10	200			1054				■ 2nd V. Amp. Screen Byp
C	40	50							Vert. Output Cath. Byp.
C8	25	25	22-1903	PRS25/25	BR202A			TVA-6	Vert. Cent. Bypass
C9	500	3	22-1904	PRS6/500	BRH6N5			UNC-506	Hor. Cent. Bypass
C10	25	25	22-1902	PRS25/25	BR202A			TVA-6	Bias Filter
C11	200		22-1668			GP2K-200			AGC Filter
C12	200		22-1668			GP2K-200			Fixed Padder
C13	.001		22-1988			GP2L-001			RF Cath. Bypass
C14	200		22-1668			GP2K-200			RF Screen Bypass
C15	.001		22-1988			GP2L-001			RF Fil. Bypass
C16	200		22-1668			GP2K-200			RF Decoupling
C17	.001		22-1988			GP2L-001			RF Bypass
C18	200		22-1668			GP2K-200			Fixed Padder
C19	200		22-1668			GP2K-200			Mixer Cath. Bypass
C20	200		22-1668			GP2K-200			Mixer Screen Bypass
C21	1.2		22-1765						Osc. Coupling
C22	16		22-1895			NPOK-10			Osc. Grid Cap.
C23	27		22-1976			GP1K-50			" "
C24	46								Fixed Trimmer ±2.5%
C25	100		22-1947			GP1K-100			Osc. Fil. Bypass
C26	100		22-1947	1468-0001	5W5T1	GP1K-100	M0.5-31	1FM-31	IF Coupling
C27	52		22-1976	1469-00005	5R5Z5		M0S.5-45	MS-45	Fixed Trimmer ± 5%
C28	8		22-1889						Fixed Trimmer " "
C29A	.001§		105-17	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	1st V. IF Screen Bypass
B	.001§			1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	1st V. IF Plate Dec.
C30	200		22-1668	1468-0002	5W5T2	GP2K-200	M0.5-32	1FM-32	IF Coupling
C31A	.015		105-17	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	AGC Filter
B	.001§			1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	2nd V. IF Screen Bypass
C32	200		22-1668	1468-0002	5W5T2	GP2K-200	M0.5-32	1FM-32	IF Coupling
C33A	.001§		105-17	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	3rd V. IF Cath. Bypass
B	.001§			1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	3rd V. IF Screen Bypass
C34A	.001§		105-17	1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	RF Bypass
B	.001§			1467-0015	1W5D15	GP2L-0015	MW.5-215	1FM-215	3rd V. IF Plate Dec.
C35	7.5		22-1898						Diode Filter ±10%
C36	.047	400	22-1775	P488-047	GT4S5		ST-4-05	TM-15	Video Coupling
C37	.001		27-208						Fixed Trimmer
C38	.001		22-1988	1468-0001	1W5D1	GP2L-001	MW.5-21	1FM-21	V. Det. & V. Amp. Fil. Byp
C39	470	500	22-1138	1466-0005	5W5T5	GP2K-500	M0.5-35	1FM-35	AGC Filter
C40	.001	400	22-1839	P688-001	GT6D1	GP2L-001	ST-4-001	TM-21	" "

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1.5Meg.	½	63-1671			Vert. Hold Control
B	Shaft		Not Req.			Attach to R1A Per Instructions
R2	750Ω	4	63-1668	W-750Ω	58-750Ω	Focus Control
R3	20Ω	1	63-1670	W20X10Ω§		Vert. Centering Control Tapped @ 10Ω
R4	100Ω	1	63-1669	W-100Ω	43-100Ω	Horiz. Centering Control
R5A	2 Meg.	½	63-1673		AM-33-S	Height Control
B	Shaft		Not Req.		KSS-3§	Attach to R5A Per Instructions
R6A	25KΩ	½	63-1675	D11-120	AM-40-S	Horiz. Drive Control
B	Shaft		Not Req.	KSS-3§	KSS-3§	Attach to R6A Per Instructions
R7A	5000Ω	½	63-1674	D11-114	AM-19-S	Vert. Linearity Control
B	Shaft		Not Req.	E §	KSS-3§	Attach to R7A Per Instructions
R8A	10KΩ	½	63-1682	D11-128	AM-49-S	Brightness Control
B	Shaft		Not Req.	E	KSS-3	Attach to R8A Per Instructions
R9A	50KΩ	½	63-1672	D11-123	AM-44-S	Horiz. Hold Control
B	Shaft		Not Req.	E	KSS-3	Attach to R9A Per Instructions
R10A	1 Meg.	½	63-1667			Volume Control and Switch
B	5000Ω	½				Contrast Control
R11	350Ω to 40000Ω	1	63-1690			Sensitivity Control

* Omit bypass section.
† Parallel sections to obtain desired capacity.
‡ Used only in chassis 28P20Z.
§ File shaft to duplicate original.

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES All resistors are ± 10% unless otherwise stated.	
R12	1 Meg.	½	63-1912	BTS-1 Meg.	RF Grid	20%
R13	47Ω	½	63-1729		RF Cathode	
R14	22KΩ	½	63-1841	BTS-22K	RF Screen Decoupling	
R15	1000Ω	½	63-1785	BTS-1000	RF Decoupling	
R16	2.2 Meg.	½	63-1926		Mixer Grid	20%
R17	82Ω	½	63-1782	BTS-820	Mixer Cathode	
R18	68KΩ	½	63-1905		Mixer Screen Dropping	20%
R19	1000Ω	½	63-1785	BTS-1000	Mixer Plate	
R20	4700Ω	1	63-943	BTA-4700	Osc. Plate	
R21	4700Ω	1	63-943	BTA-4700	" "	
R22	1500Ω	½	63-1792	BTS-1500	Osc. Grid	
R23	47KΩ	½	63-1855	BTS-47K	"	
R24	10Ω	½	63-1701		Parasitic Suppressor	
R25	3300Ω	½	63-1806	BTS-3300	1st Video IF Grid	
R26	82Ω	½	63-1740		1st Video IF Cathode	
R27	220Ω	½	63-1758		1st Video IF Screen Decoupling	20%
R28	470Ω	½	63-1772	BTS-470	1st Video IF Plate Decoupling	20%
R29	1000Ω	½	63-1786	BTS-1000	AGC Network	20%
R30	620Ω	½	63-1818		2nd Video IF Grid	5%

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES ALL RESISTOR ARE ± 10% UNLESS OTHERWISE STATED.	
R31	82Ω	½	63-1740		2nd Video IF Cathode	
R32	220Ω	½	63-1758		2nd Video IF Screen Decoupling	20%
R33	4700Ω	½	63-1816	BTS-4700-5%	2nd Video IF Plate	5%
R34	470Ω	½	63-1772	BTS-470	2nd Video IF Plate Decoupling	20%
R35	150Ω	½	63-1751		3rd Video IF Cathode	20%
R36	33KΩ	½	63-1846	BTS-33K	3rd Video IF Screen Dropping	
R37	470Ω	½	63-1772	BTS-470	3rd Video IF Plate Decoupling	20%
R38	39KΩ	½	63-1852	BTS-39K	Peaking Coil Shunt	
R39	27KΩ	½	63-1845	BTS-27K	AGC Amp. Grid	
R40	3300Ω	½	63-1809	BTS-3300-5%	Video Det. Load	5%
R41	2.2 Meg.	½	63-1926	BTS-2.2 Meg.	Bias Voltage Divider	
R42	2.2 Meg.	½	63-1926	BTS-2.2 Meg.	1st Video Amp. Grid	
R43	1000Ω	1	63-1786	BTS-1000	1st Video Amp. Plate	
R44	470Ω	1		BTA-470	Decoupling	
R45	330KΩ	½	63-1890	BTA-330K	AGC Network	20%
R46	2200Ω	½		BTS-2200-5%	1st AGC Amp. Cathode	5%
R47	180KΩ	½		BTS-180K	Voltage Divider	
R48	1.5 Meg.	½	63-1919	BTS-1.5 Meg.	2nd AGC Amp. Plate	
R49	68KΩ	½		BTS-68K	" " "	
R50	100KΩ	½	63-1870	BTS-100K	AGC Filter	20%
R51	100KΩ	½	63-1870	BTS-100K	" "	20%
R52	47KΩ	½	63-1856	BTS-47K	" "	20%
R53	820Ω	½	63-1781	BTS-820K-5%	Video Amp. Plate	5%
R54	12KΩ	½	63-1831	BTS-12K	Voltage Divider	
R55	33KΩ	½	63-1849	BTS-33K	" "	20%
R56	1 Meg.	½	63-1918	BTS-1 Meg.	2nd Video Amp. Grid	20%
R57	8200Ω	½	63-1824	BTS-8200	2nd Video Amp. Screen	
R58	16KΩ	½	63-1827	BTS-16K	Voltage Divider	
R59	39KΩ	½	63-1852	BTS-39K	Peaking Coil Shunt	
R60	62000Ω	2	63-1579		2nd Video Amp. Plate	5%
R61	82KΩ	½	63-1866	BTS-82K	Voltage Divider	
R62	33KΩ	½	63-1849	BTS-33K	Picture Tube Cathode	20%
R63	120KΩ	½	63-1873	BTS-120K	Voltage Divider	
R64	10KΩ	½	63-1684	AB-10K	Bleeder	
R65	68Ω	½	63-1737		1st Sound IF Cathode	20%
R66	6800Ω	2	63-1571	BT-2-6800	1st Sound IF Decoupling	
R67	6800Ω	2	63-1571	BT-2-6800	2nd Sound IF Decoupling	
R68	68Ω	½	63-1737		2nd Sound IF Cathode	20%
R69	100KΩ	½	63-1870	BTS-100K	Limiter Grid	20%
R70	1 Meg.	½	63-1912	BTS-1 Meg.	Isolation	20%
R71	47KΩ	1	63-1194	BTA-47K	Limiter Decoupling	
R72	150KΩ	1	63-1876	BTA-150K-5%	Disc. Load	5%
R73	150KΩ	1	63-1876	BTA-150K-5%	" "	5%
R74	10KΩ	½	63-1828	BTS-10K	De-emphasis	
R75	15 Meg.	½	63-1961	BTS-15 Meg.	AF Grid	
R76	22KΩ	½	63-1842	BTS-22K	Tone Compensation	20%
R77	100KΩ	½	63-1869	BTS-100K	De-emphasis	
R78	220KΩ	½	63-1883	BTS-220K	AF Plate	
R79	330KΩ	½	63-1890	BTS-330K	Output Grid	
R80	220Ω	1	63-1227	BW-1-220	Output Cathode	
R81	2.2 Meg.	½	63-1926	BTS-2.2 Meg.	Voltage Divider	20%
R82	2.2 Meg.	½	63-1926	BTS-2.2 Meg.	Sync. Clipper Grid	20%
R83	3300Ω	½	63-1807	BTS-3300	Sync. Clipper Plate	
R84	33KΩ	½	63-1849	BTS-33K	Sync. Clipper Plate	20%
R85	18KΩ	½	63-1827	BTS-18K	Voltage Divider	
R86	2.2 Meg.	½	63-1926	BTS-2.2 Meg.	Sync. Amp. Grid	
R87	2.2 Meg.	½	63-1926	BTS-2.2 Meg.	Voltage Divider	
R88	10KΩ	½	63-1827	BTS-10K	Sync. Amp. Plate	
R89	10KΩ	½	63-1827	BTS-10K	Sync. Amp. Plate Decoupling	
R90	1 Meg.	½	63-1912	BTS-1 Meg.	2nd Sync. Clipper Grid	20%
R91	12KΩ	½	63-1831	BTS-12K	2nd Sync. Clipper Plate	
R92	1 Meg.	½	63-1912	BTS-1 Meg.	Sync. Sep. Grid	20%
R93	2.2 Meg.	½	63-1926	BTS-2.2 Meg.	Voltage Divider	
R94	10KΩ	½	63-1827	BTS-10K	Sync. Sep. Plate	
R95	8200Ω	½	63-1824	BTS-8200	" " "	
R96	8200Ω	½	63-1824	BTS-8200	Integrator Network	
R97	8200Ω	½	63-1824	BTS-8200	" " "	
R98	8200Ω	½	63-1824	BTS-8200	" "	
R99	1 Meg.	½	63-1912	BTS-1 Meg-5%	Vert. Osc. Grid	5%
R100	220KΩ	½	63-1884	BTS-220K	Vert. Osc. Plate	
R101	82000Ω	½	63-1824	BTS-8200	Vert. Peaking	
R102	4.7 Meg.	½	63-1940	BTS-4.7 Meg.	Vert. Output Grid	20%
R103	1500Ω	1	63-1967	BTA-1500	Vert. Output Cathode	
R104	33KΩ	½	63-1848	BTS-33K	Bias Network	
R105	10KΩ	½	63-1827	BTS-10K	" "	
R106	2700Ω	2	63-1169	BT-2-2700	Filter See Note 1	
R107	470KΩ	½	63-1896	BTS-470K	Horiz. Disc. Load	
R108	470KΩ	½	63-1896	BTS-470K	" " "	
R109	470KΩ	½	63-1896	BTS-470K	AFC Filter	20%
R110	560Ω	½	63-1775	BTS-560	Horiz. AFC Grid	
R111	6800Ω	½		BTS-6800	Differentiator Net.	
R112	10Ω	1	63-1701		Horiz. AFC Cathode	
R113	20KΩ	2	63-1566		Horiz. AFC Plate	5%
R114	39KΩ	½	63-1852	BTS-39K	Horiz. AFC Screen Dropping	
R115	27KΩ	½	63-1845	BTS-27K	Voltage Divider	
R116	50KΩ	2	63-947	BT-2-27K	Bleeder	
R117	25000Ω	5	63-1532	AB-2500	Filter	
R118	22KΩ	½	63-1842	BTS-22K	Horiz. Osc. Grid	20%
R119	10KΩ	1	63-1071	BTA-10K	Horiz. Osc. Screen Dropping	
R120	5KΩ	3	63-1533	AB-5000	Horiz. Osc. Plate	
R121	18KΩ	½		BTS-18K	Differentiator	
R122	30KΩ	3	63-1533	BT-2-27K	Bleeder	
R123	220KΩ	½		BTS-220K	Horiz. Discharge Grid	
R124	560KΩ	½		BTS-560K-5%	Horiz. Discharge Plate	5%
R125	8200Ω	½	63-1824	BTS-8200	Horiz. Peaking	
R126	150Ω	½	63-1751		Parasitic Suppressor	20%
R127	470KΩ	½	63-1898	BTS-470K	Horiz. Output Grid	
R128	150Ω	2	63-1578	BW-2-150	Horiz. Output Cathode	
R129	10KΩ	2	63-1198	BT-2-10K	Horiz. Output Screen Dropping	
R130	15KΩ	20	63-1679	DG-15K	Damper Filter	
R131	4.7Ω	1	63-1581	BW-1-4.7	HV Rect. Filament	
R132	3000Ω	10	63-2011	AB-3000	Filter	
R133	470KΩ	1	63-1898		HV Filter	
R134	620Ω	10	63-1685	AB-600	Focus Coil Shunt	
R135	10Ω	5	63-1996	AB-10	Bias Network	

Note 1. Some models use 2 510Ω resistors in parallel in this application.

ZENITH MODELS 28T925, 28T960, 28T961, 28T962, 28T963

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	ZENITH PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1A	117VAC @ 2.35A	790VCT @ .170 ADC 650VCT @ .210 ADC	5VAC @ 3A	5VAC @ 3A	95-1115‡		TP-390	

‡ Used in chassis 28F20, 28F21

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1B	117VAC 2.35A	810VCT @ .170 ADC 660VCT @ .195 ADC	5VAC @ 3A	5VAC @ 3A	95-1124‡		TP-390	

‡ Used in chassis 28F22

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	ZENITH PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T2	117VAC @ .76A	5VAC @ 2A SEC. 4 6.4VAC @ 4.1A	6.4VAC @ .6A	6.4VAC @ 5A	95-1116			

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE		REPLACEMENT DATA				NOTES
	PRI.	SEC.	ZENITH PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	
T3	67Ω CT	55Ω Tap @ 15Ω	S-15041				Horiz. Osc.-AFC Trans.
T4	57Ω	200Ω	95-1113	A-8121	TB0-1	A-4000	Vert. Block Osc. Trans
T5	455Ω Tap @ 80Ω	7Ω Tap @ .5Ω SEC. 2 0Ω	S-15015				Hor. Output Trans.
T6	590Ω	14Ω	95-1112	A-8115 Ø	TV0-1 Ø	A-3035 Ø	Vert. Output Trans.
T7A	14Ω		95-1110	DY-1			Hor. Deflection Yoke
B	60Ω						Vert. Deflection Yoke
T8	570Ω		95-1111	FC-10			Focus Coil

Ø Drill new mounting holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE		RATING DC RES.		REPLACEMENT DATA ZENITH PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	INSTALLATION NOTES
	PRI.	SEC.	PRI.	SEC.					
T9	5100Ω	3.5Ω	570Ω	.6Ω	95-1108	A-3849	R0-9	A-2902	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA ZENITH PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	V. C. IMP.		ST-120		† Replace output transformer to match 6-8Ω voice coil.
SP1A	PM	3.5Ω	49-649 *	MOD.P10-S† ST-107	10A31	
B	PM	3.5Ω	49-654 #	MOD.P5-V	52A21	* Used in models 28T960,28T961 28T962, 28T963
	CONE DIA.	V. C. DIA.				# Used in model 28T925
SP2A	9 3/8"	3/4"				
B	5"	9/16"				

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ↶)	REPLACEMENT DATA ZENITH PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.	INSTALLATION NOTES
L1	.170A	135Ω	5 Henry	95-1109	C-2325		C-2971	
L2	.210A	135Ω	5 Henry	95-1109	C-2325		C-2971	

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

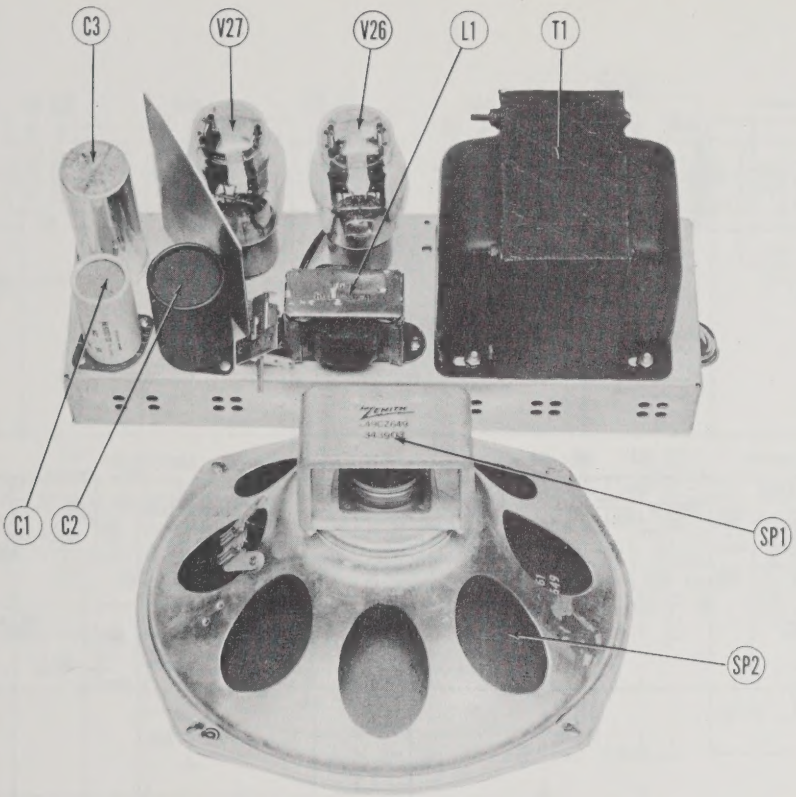
ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	ZENITH PART No.	MEISSNER PART No.	
L3	Ant. Input	0Ω		S-15062		
L4	Mixer Plate	.6Ω		S-15064		
L5	High Freq. Osc.	0Ω		S-15043		
L6	Low Freq. Osc.	0Ω		S-15066		
L7	Fil. Choke	.1Ω		S-15065		
L8	1st Video IF	0Ω	0Ω	S-15048		
L9	Sound IF Trap	.2Ω		S-15060		
L10	Video IF Coupling	.2Ω		S-15049		
L11	2nd Video IF	.1Ω		S-15061		
L12	Adjacent Sound IF Trap	0Ω		S-15063		
L13	3rd Video IF	.1Ω		S-15052		
L14	4th Video IF	.1Ω	.1Ω	S-15054		
L15	Sound IF Trap	0Ω		S-15067		
L16	Peaking	5Ω		S-15058		
L17	Peaking	7Ω		S-15059		
L18	Fil. Choke	.1Ω		S-15060		
L19	RF Choke	1.5Ω		S-15128		
L20	Peaking	2Ω		S-15125		
L21	Peaking	8Ω		S-15127		
L22	Peaking	6Ω		S-15126		
L23	1st Sound IF	.2Ω		95-1121		
L24	2nd Sound IF	.1Ω	.1Ω	95-1118		
L25	3rd Sound IF	.1Ω	.1Ω	95-1119		
L26	Sound Disc. Transformer	.1Ω	.1Ω	95-1120		
L27	Width Control	.3Ω		S-15042		
L28	Fil. Choke			20-256		

DIAL LIGHTS

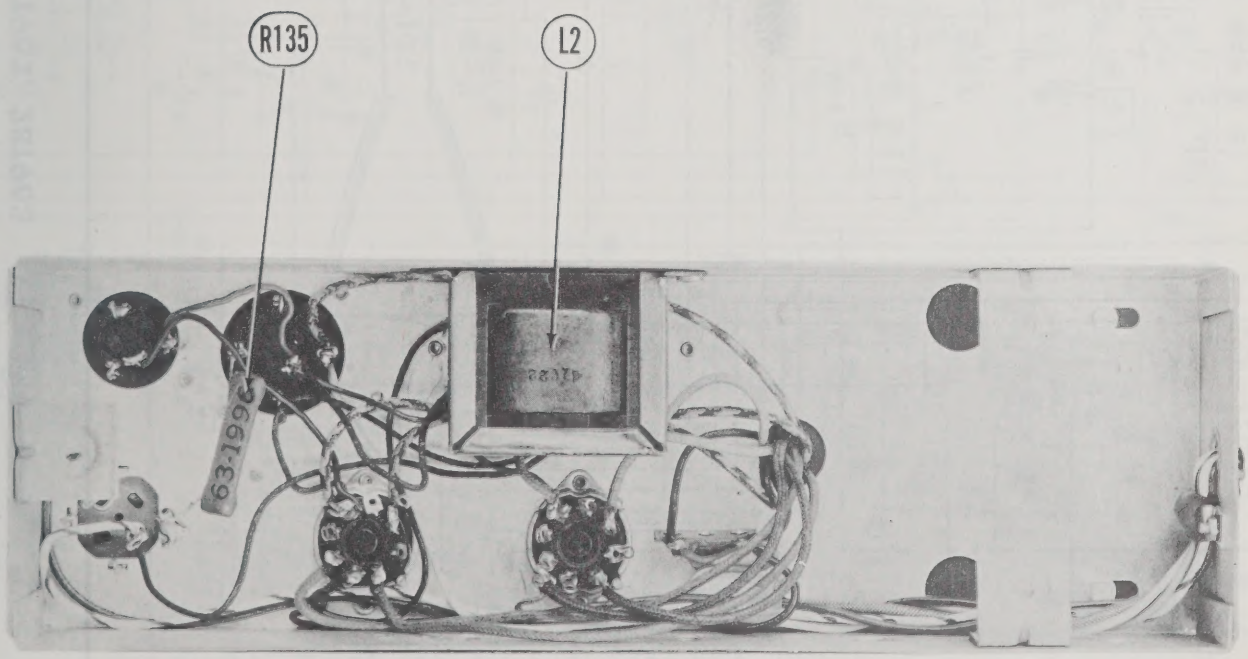
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					ZENITH PART No.		
M1	Bayonet	6-8V	0.25A	Blue	100-36		Type #44
M2	Bayonet	6-8V	0.25A	Blue	100-36		Type #44

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M3	Tuner Assembly	S-15020	
M4	Channel Strip Assy.	S-15029	Channel #2-Channel number is stamped on each strip
		S-15030	Channel #3
		S-15031	Channel #4
		S-15032	Channel #5
		S-15033	Channel #6
		S-15034	Channel #7
		S-15035	Channel #8
		S-15036	Channel #9
		S-15037	Channel #10
		S-15038	Channel #11
		S-15039	Channel #12
		S-15040	Channel #13
M5	Focus Range Switch		
M6	Dial Light Switch		
	Ion Trap	S-15320	Used only with 10BP4 or 12LP4 Picture tube
	Socket and Wire Assy.	S-15207	Picture tube
	AC Plug & Bracket Assy.	S-15132	
	Channel Indicator Disc.	27-112	
	Contrast Indicator Disc.	27-113	
	Antenna Terminal Strip	83-1570	
	12" Safety Glass	192-122	
	10" Safety Glass	192-123	



POWER SUPPLY CHASSIS-TOP VIEW



POWER SUPPLY CHASSIS-BOTTOM VIEW

HORIZONTAL FREQUENCY ADJUSTMENT

1. Turn the horizontal hold control fully counter clockwise.
2. Adjust Horizontal Frequency adjustment B2 until picture locks in "sync".
3. Turn the horizontal hold fully clockwise. If picture loses "sync", slight readjustment is necessary. Readjustment is also necessary if receiver loses sync when the channel selector switch is turned to another channel and then returned to the original channel.

HORIZONTAL PHASE ADJUSTMENT

Turn adjustment screw B3 and the picture will move to the right or left side of the raster. When B3 is properly adjusted the picture is moved farthest to the right. A broad peak is noted at this point.

AGC ADJUSTMENT

The performance of the AGC circuit is checked and adjusted by applying a known voltage to the video detector test jack "S" and noting the corresponding voltage at the AGC test jack "C". To adjust the AGC circuit to the correct operating point proceed as follows:

1. Turn channel selector switch to a locally unused channel. Disconnect the antenna and short the antenna terminals.
2. Apply -1.5 Volts to test jack "S" (Positive to chassis). This voltage may be obtained from the center arm of a high value potentiometer with the outside terminals across a 3 volt battery.
3. Connect VTVM from test jack "C" to chassis.
4. Adjust B1 until -3.8 Volt reading is obtained on VTVM.
5. Readjust input to test jack "S" to -2 Volts. The corresponding voltage on the VTVM connected to test jack "C" should be -6 to -8 volts.